Glenn Springs Holdings, Inc.

Baseline Human Health Risk Assessment

Newark Bay Study Area

January 2019

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Acronyms and Abbreviations

ADAF	age-dependent adjustment factor
AOC	Administrative Order on Consent
ATSDR	Agency for Toxic Substances and Disease Registry
BaP	benzo(a)pyrene
BHHRA	Baseline Human Health Risk Assessment
BMD	benchmark dose
BMDL	BMD lower confidence level
CalEPA	California Environmental Protection Agency
CDC	U.S. Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
CSF	cancer slope factor
CSO	combined sewer overflow
CTE	central tendency exposure
DAF	dermal absorption fraction
DL	dioxin-like
DLC	dioxin-like compounds
DMA	dimethylarsinic acid
ED	exposure duration
ELCR	excess lifetime cancer risk
EPC	exposure-point concentration
FDA	U.S. Food and Drug Administration
FI	fraction ingested
GROS	Gamma Regression on Order Statistics
GSH	Glenn Springs Holdings, Inc.
HEAST	Health Effects Assessment Summary Tables
HED	human equivalent dose
HHCSM	human health conceptual site model
HI	hazard index

HQ	hazard quotient
IARC	International Agency for Research on Cancer
IRIS	Integrated Risk Information System (USEPA)
IUR	inhalation unit risk
KM	Kaplan-Meier (calculator)
LADD	lifetime average daily dose
LMS	Linearized multistage
LOAEL	lowest-observed-adverse-effect level
LPRSA	Lower Passaic River Study Area
MCL	maximum contaminant level
MOA	mode of action
MRL	minimal risk level
NBSA	Newark Bay Study Area
NCP	National Contingency Plan
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
NOAEL	no-observed-adverse-effect level
NTP	National Toxicology Program
NY	New York
ODEQ	Oregon Department of Environmental Quality
OU	operable unit
PAH	polyaromatic hydrocarbon
PAR	Pathways Analysis Report
PbB	blood lead
PCB	polychlorinated biphenyl
PCDD/Fs	polychlorinated dibenzo(p)dioxins and furans
POD	point of departure
POTW	publicly owned treatment works
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	preliminary remediation goal
QAPP	Quality Assurance Project Plan

RAGS	Risk Assessment Guidance for Superfund
ReP	relative effects potency
RfC	reference concentration
RfD	reference dose
RI/FS	remedial investigation and feasibility study
RME	reasonable maximum exposure
RPF	relative potency factor
RSL	Regional Screening Level
SL	screening level
SQT	Sediment Quality Triad
STSC	Superfund Health Risk Technical Support Center
SV-CWCM	Small Volume Chemical Water Column Monitoring
SVOC	semi-volatile organic compound
TEF	toxic equivalency factor
TEQ	toxicity equivalence
Tierra	Tierra Solutions, Inc.
TPH	total petroleum hydrocarbon
UCL	upper confidence limit
UF	uncertainty factor
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

Executive Summary

The Baseline Human Health Risk Assessment for the Newark Bay Study Area, referred to herein as the Baseline Human Health Risk Assessment (BHHRA), has been prepared as part of the Newark Bay Study Area (NBSA) remedial investigation/feasibility study (RI/FS). The BHHRA and RI/FS are being conducted by Glenn Springs Holdings, Inc. (GSH) on behalf of Occidental Chemical Corporation (the successor to Diamond Shamrock Chemicals Company [formerly known as Diamond Alkali Company]) pursuant to the Administrative Order on Consent (AOC) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA Index 02-2004-2010; USEPA 2004a). The BHHRA meets the requirements of the AOC and National Contingency Plan (NCP) (USEPA 1990). This report describes the approach, methods, and assumptions used by GSH to conduct the BHHRA, in accordance with U.S. Environmental Protection Agency (USEPA) risk assessment guidance.

The primary purpose of a BHHRA is two-fold: (1) provide risk managers with an understanding of potential current and future human health risks in the absence of remediation or exposure controls, including uncertainties (USEPA 1989, 1991d), and (2) provide the public with information regarding human health risks. The BHHRA for the NBSA uses available data and information from recent site-specific studies in a risk-based framework to characterize potential human health risks currently and in the future, consistent with USEPA guidance (1989, 1991d, 2005a). The BHHRA has been performed in a manner consistent with the Revised Pathways Analysis Report (Revised PAR) for the NBSA (Battelle 2018), and addresses comments and revisions on draft Risk Assessment Guidance for Superfund (RAGS) Part D tables provided by USEPA, USEPA review of responses to comments on the draft RAGS Part D tables, and agreed-upon resolutions to draft RAGS Part D tables (USEPA 2017a, 2017b, 2017c, 2018a, 2018b, 2018c).

ES.1 Summary of Key Findings

Consumption of fish or crab represents the primary source of risk to human health in the NBSA. For anglers who routinely consume their catch, the potential cancer risks exceed the NCP risk range of 10^{-6} to 10^{-4} used by USEPA to determine whether a site poses an unacceptable risk, and the noncancer hazards are above the goal of a noncancer hazard index equal to 1. These results are summarized below.

Fish Consumption

	Summary of Key Findings Angler/Sportsman - Fish Consumption (a)							
	RME				**CTE**			
	Child	**Adolescent**	**Adult**	**Combined Adult/Child**	**Child**	**Adolescent**	**Adult**	**Combined Adult/Child**
Cumulative Cancer Risk	3E-04	3E-04	6E-04	8E-04	9E-06	1E-05	2E-05	3E-05
Primary Contributors (b)	PCB-126: 31% (38% for all DL-PCBs) 2,3,7,8-TCDD: 28% (33% for all PCDD/Fs) Non-DL PCBs: 18% Arsenic, inorganic: 4% Dieldrin: 3%				PCB-126: 35% (43% for all DL-PCBs) 2,3,7,8-TCDD: 29% (34% for all PCDD/Fs) Non-DL PCBs: 10% Arsenic, inorganic: 6% Dieldrin: 3%			
Cumulative Noncancer HI	4E+01	3E+01	3E+01	NA	4E+00	2E+00	2E+00	NA
Primary Contributors (b)	Non-DL PCBs: 32% PCB-126: 21% (26% for all DL-PCBs) 2,3,7,8-TCDD: 19% (22% for all PCDD/Fs) Methyl mercury: 6% 4,4'-DDD: 5%				Non-DL PCBs: 31% PCB-126: 20% (25% for all DL-PCBs) 2,3,7,8-TCDD: 17% (20% for all PCDD/Fs) Methyl mercury: 8% 4,4'-DDD: 4%			
Noncancer Health Effects with HI>1	Reproductive (DL compounds) Whole-Body (non-DL PCBs) Liver (pesticides) Neurological (Methyl mercury)				Reproductive (DL compounds)			

Notes:

Shading indicates that the cumulative potential carcinogenic risk exceeds 10-4, or one or more target organ-specific hazard indices exceed one.

(a) Cumulative cancer risks differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented are those based on the KM TEQ calculator.

(b) Primary contributors for cancer risk are based on the combined adult/child scenario and primary contributors for noncancer hazard index are based on the child scenario.

Crab Consumption

	Summary of Key Findings Angler/Sportsman - Crab Consumption (a)							
	RME				CTE			
	Child	Adolescent	Adult	Combined Adult/Child	Child	Adolescent	Adult	Combined Adult/Child
Cumulative Cancer Risk	3E-04	3E-04	6E-04	8E-04	2E-05	2E-05	4E-05	5E-05
Primary Contributors (b)	2,3,7,8-TCDD: 52% (60% for all PCDD/Fs) PCB-126: 19% (23% for all DL-PCBs) Non-DL PCBs: 8% Arsenic, inorganic: 6%				2,3,7,8-TCDD: 54% (63% for all PCDD/Fs) PCB-126: 20% (24% for all DL-PCBs) Arsenic, inorganic: 6% Non-DL PCBs: 4%			
Cumulative Noncancer HI	3E+01	2E+01	2E+01	NA	5E+00	3E+00	3E+00	NA
Primary Contributors (b)	2,3,7,8-TCDD: 44% (51% for all PCDD/Fs) Non-DL PCBs: 19% PCB-126: 16% (20% for all DL-PCBs)				2,3,7,8-TCDD: 44% (51% for all PCDD/Fs) Non-DL PCBs: 19% PCB-126: 16% (20% for all DL-PCBs)			
Noncancer Health Effects with HI>1	Reproductive (DL compounds) Whole-Body (non-DL PCBs)				Reproductive (DL compounds)			

Notes:

Shading indicates that the cumulative potential carcinogenic risk exceeds 10-4, or one or more target organ-specific hazard indices exceed one.

(a) Cumulative cancer risks differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented are those based on the KM TEQ calculator.

(b) Primary contributors for cancer risk are based on the combined adult/child scenario and primary contributors for noncancer hazard index are based on the child scenario.

Recreational and Worker Sediment and Surface Water Contact

The potential cumulative cancer risks and noncancer hazards for recreational receptors who visit the NBSA, including swimmers, waders, and boaters, and have direct contact with accessible surface sediment and surface water are within or below the NCP risk range and noncancer protection goal for both the RME and CTE scenarios. The same is true for workers who have direct contact with accessible surface sediment.

ES.2 Summary of BHHRA

The BHHRA was conducted in accordance with USEPA’s four-step risk assessment paradigm (USEPA 1989):

- Data evaluation and hazard identification
- Exposure assessment
- Toxicity assessment
- Risk characterization.

Each of the four steps is summarized below.

ES.2.1 Data Evaluation and Hazard Identification

The BHHRA was based solely on validated data from the RI/FS program, which were collected in accordance with Quality Assurance Project Plans (QAPPs) approved by USEPA Region 2. These include:

- 41 accessible surface sediment samples (including field duplicates) from 39 nearshore and mudflat locations
- 131 near-surface (shallow) surface water samples from six locations in Newark Bay
- 95 samples (including duplicates) from five fish species (American eel, bluefish, striped bass, summer flounder, and white perch)
- 37 samples each of crab muscle only and crab hepatopancreas only.

All data were validated according to approved QAPPs, with nearly all of the data determined to be valid and acceptable for use in the BHHRA, as qualified. A total of 84 chemicals were identified as chemicals of potential concern (COPCs) in one or more of these media based on a screening process that considered carcinogen status, essential nutrient status, frequency of detection, and comparison of maximum concentrations to risk-based screening levels, consistent with the Revised PAR. These included polychlorinated dibenzo(p)dioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons, various pesticides and inorganics, a few total petroleum hydrocarbon (TPH) ranges, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). An additional 56 chemicals were evaluated qualitatively in the uncertainty evaluation. The COPC screening process was designed to ensure that chemicals not identified as COPCs are only minor contributors to overall site risks and noncancer hazards.

ES.2.2 Exposure Assessment

Newark Bay (the Bay) is a 6.3-square-mile enclosed embayment on the western side of the New York/New Jersey (NY/NJ) Harbor Estuary and is central to one of the most urbanized and industrialized areas in the United States. The Bay is adjacent to four large cities (Newark, Elizabeth, Bayonne, and Jersey City) and is fringed on its western side by port facilities, industrial facilities, and Newark Liberty International Airport. On its northern side, the Hackensack and Passaic Rivers flow into the Bay, while on the southern side, the Bay is connected to New York Harbor (NY) and Raritan Bay (NJ) through two tidal straits: Kill van Kull and Arthur Kill, respectively. The NBSA has been defined as the Bay and portions of key tributaries, including the Hackensack River, Arthur Kill, and Kill van Kull.

Human use of the NBSA is primarily industrial and commercial. Recreational use is more limited due to access limitations from the shoreline types (i.e., bulkhead, bridges, sheet piling, and mudflats) and surrounding urban/industrial/commercial land use. Access for recreation is through available public access areas and pleasure boating (i.e., from marinas inside and outside of the NBSA). Some consumption of fish and crab from the Bay has been reported, despite consumption advisories for certain fish species and a ban on the harvest and consumption of blue crab from the NBSA (Pflugh et al. 1999). People catch and consume fish and crab in the Bay, including species identified in the advisories. This has been reported along the Bayonne waterfront on the eastern side of the Bay; on the pilings of the Central Railroad of New Jersey/Newark Bay Bridge (also known as Old Bay Bridge), which was demolished in the 1980s; and at other piers, exposed rocky shorelines, pilings, and docks (Anglerweb.com, accessed April 27, 2017).

Potential receptors and exposure pathways identified for quantitative evaluation in the human health conceptual site model (HHCSM) for the NBSA include the following:

- Anglers/sportsmen who may be exposed via fish or shellfish[1] ingestion, dermal contact with sediment and surface water, and incidental ingestion of sediment and surface water
- Swimmers, waders, and boaters who may be exposed via dermal contact with sediment and surface water, and incidental ingestion of sediment and surface water
- Workers who may be exposed via dermal contact with sediment and incidental ingestion of sediment.

Potential exposure via inhalation of vapors in outdoor air as a result of volatilization of volatile and semivolatile organic compounds in sediment and surface water was shown to pose negligible risks to all receptors by a quantitative screening-level evaluation; therefore, this pathway was excluded from the final cumulative risk estimates in the BHHRA. Potential exposure via ingestion of waterfowl or species other than fish and crabs, and potential exposure of residential or transient receptors, are also not included in the quantitative risk assessment calculations; however, potential risks associated with these exposure pathways and receptors relative to other pathways and receptors are discussed qualitatively in the uncertainty evaluation.

Two exposure scenarios are evaluated in the BHHRA, consistent with USEPA (1992a) guidance: a reasonable maximum exposure (RME) scenario and a central tendency exposure (CTE) scenario. The intent of the RME scenario is to estimate a conservative exposure case that is above the average case but still within the range of possible exposures (USEPA 1989, 1992a). The CTE scenario uses average exposure parameters to calculate the average exposure of an individual. While risk management decisions are based on the RME scenario (USEPA 1989), these two scenarios provide risk managers with an estimated range of risks for the exposed population. The exposure assumptions for both scenarios are intended to reflect exposures under both current and future site uses. The fish and crab ingestion rates established by USEPA Region 2 (2012a, 2012b) for the Lower Passaic River Study Area (LPRSA) are used in this BHHRA. Exposure to fish and crab tissue, as well as accessible surface sediment and surface water, is evaluated on a Bay-wide basis. In addition, the exposure-point concentration (EPC) for both the RME and CTE scenarios is the lower of the 95 percent upper confidence limit (95% UCL) of the arithmetic mean or the maximum concentration, consistent with USEPA guidance.

[1] While multiple shellfish may be present in Newark Bay, ingestion of shellfish is based solely on data for blue crab.

The BHHRA evaluated a “mixed fish” diet to account for the presence of multiple fish species in Newark Bay that may be consumed by anglers, which is assumed to comprise equal amounts (20%) of the five species collected as part of the RI/FS (American eel, bluefish, striped bass, summer flounder, and white perch). A supplemental analysis of individual fish species diets was included in the uncertainty evaluation. Similarly, the BHHRA evaluated crab muscle and hepatopancreas tissues combined, to account for the possibility that the crab is cooked before the hepatopancreas is removed. A supplemental analysis of a crab-muscle-only diet was included in the uncertainty section. Finally, no cooking loss is considered in the RME scenario for both fish and crab consumption, which assumes that fat, pan drippings, and cooking juices are consumed. For the CTE scenario, cooking loss was included for fish consumption (insufficient data are available for crab consumption).

ES.2.3 Toxicity Assessment

The toxicity criteria used in the BHHRA were selected according to USEPA (2003a; 2018e) guidance, including cancer and noncancer criteria for oral and dermal exposures. USEPA (2004b) default dermal absorption factors were used to adjust oral toxicity criteria for evaluating dermal exposure. In addition, USEPA’s age-dependent adjustment factors were used to evaluate early-life exposures for chemicals believed to act by a mutagenic mode of action (USEPA 2005c). Blood lead models were used to evaluate potential exposure to lead (USEPA 1994a, 1994b, 2017d; Bowers et al. 1994).

For PCDD/Fs and dioxin-like (DL) PCBs (collectively referred to as dioxin-like compounds [DLCs]), cancer risks and hazard indices were estimated for the individual congeners, as well as in terms of a total toxicity equivalence (TEQ) for PCDDD/Fs and PCBs (TEQ DF and TEQ PCB, respectively). The toxicity criteria for these compounds are based on the cancer and noncancer criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and congener-specific toxicity equivalency factors (TEFs). The TEQ DF and TEQ PCB were calculated by two methods: (1) using USEPA’s Kaplan-Meier (KM) calculator (Version 9.1; issued July 2014), or (2) manually based on the TEQ concentration for each congener. The remaining non-DL PCB congeners were evaluated as a group (Total non-DL PCBs) using toxicity criteria for PCBs (high risk) and Aroclor 1254 for cancer and noncancer effects, respectively. Cumulative risk/hazard estimates are presented based on KM TEQs, as well as based on TEQs calculated manually. As discussed further below, there is essentially no difference in the risk/hazard estimates between the two methods; however, the latter method allows for identification of the specific congeners that contribute most to the overall risk/hazard.

ES.2.4 Risk Characterization Results

The estimated cancer risks were compared to the NCP risk range of 10^{-6} to 10^{-4}, and estimated noncancer hazards were compared to a hazard index of 1 (USEPA 1991d). In addition, noncancer hazard indices greater than 1 were further evaluated on a target-organ-specific basis (USEPA 1989). Tables ES-1 through ES-4 below present the RME and CTE cumulative cancer risks and total noncancer hazard indices for all receptors and exposure pathways quantitatively evaluated in the BHHRA; additional details for the receptor age group with the highest potential cancer risk and noncancer hazard are presented following the tables.

Table ES-1
Summary of Receptor/Exposure Pathway Cancer Risks for NBSA Baseline Human Health Risk Assessment (a)
Reasonable Maximum Exposure (RME)

Receptor Population	Age Group	Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		3E-04	3E-04
	Adolescent	2E-06	8E-08	3E-04	3E-04
	Adult	4E-06	5E-08	5E-04	6E-04
	Adult/Child (c)	4E-06	5E-08	8E-04	8E-04
Swimmer	Child	1E-06	2E-07	*Pathways Incomplete*	
	Adolescent	2E-06	5E-07		
	Adult	1E-06	1E-07		
	Adult/Child (c)	2E-06	3E-07		
Wader	Child	1E-06	3E-08		
	Adolescent	2E-06	7E-08		
	Adult	1E-06	1E-08		
	Adult/Child (c)	2E-06	5E-08		
Boater	Child	*Pathways Incomplete*			
	Adolescent	2E-06	3E-07		
	Adult	4E-07	3E-07		
	Adult/Child (c)	*Not Applicable*			
Worker	Adult	3E-06	*Not quantified (d)*		

Notes:
Shading indicates that the cumulative potential carcinogenic risk exceeds 10-4.

(a) Cumulative cancer risks differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented are those based on the KM TEQ calculator.
(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.
(c) Cancer risks for adult and child age groups summed to yield 26-year total exposure duration.
(d) Workers are not expected to have contact with surface water during outdoor activities.

Table ES-2
Summary of Receptor/Exposure Pathway Cancer Risks for NBSA Baseline Human Health Risk Assessment (a)
Central Tendency Exposure (CTE)

Receptor Population	Age Group	Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		9E-06	2E-05
	Adolescent	4E-07	9E-09	1E-05	2E-05
	Adult	6E-07	6E-09	2E-05	3E-05
	Adult/Child (c)	6E-07	6E-09	3E-05	5E-05
Swimmer	Child	2E-07	4E-08	*Pathways Incomplete*	
	Adolescent	3E-07	1E-07		
	Adult	2E-07	2E-08		
	Adult/Child (c)	3E-07	5E-08		
Wader	Child	2E-07	1E-08		
	Adolescent	3E-07	7E-09		
	Adult	2E-07	2E-09		
	Adult/Child (c)	3E-07	7E-09		
Boater	Child	*Pathways Incomplete*			
	Adolescent	3E-07	8E-08		
	Adult	6E-08	5E-08		
	Adult/Child (c)	*Not Applicable*			
Worker	Adult	3E-07	*Not quantified (d)*		

Notes:
Shading indicates that the cumulative potential carcinogenic risk exceeds 10-4.

(a) Cumulative cancer risks differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented are those based on the KM TEQ calculator.
(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.
(c) Cancer risks for adult and child age groups summed to yield 12-year total exposure duration.
(d) Workers are not expected to have contact with surface water during outdoor activities.

Table ES-3
Summary of Receptor/Exposure Pathway Noncancer Hazards for NBSA Baseline Human Health Risk Assessment (a)
Reasonable Maximum Exposure (RME)

Receptor Population	Age Group	Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		4E+01	3E+01
	Adolescent	1E-01	2E-03	3E+01	2E+01
	Adult	1E-01	2E-03	3E+01	2E+01
Swimmer	Child	1E-01	9E-03	*Pathways Incomplete*	
	Adolescent	9E-02	1E-02		
	Adult	3E-02	3E-03		
Wader	Child	1E-01	1E-03		
	Adolescent	9E-02	2E-03		
	Adult	3E-02	5E-04		
Boater	Child	*Pathways Incomplete*			
	Adolescent	9E-02	1E-02		
	Adult	1E-02	9E-03		
Worker	Adult	8E-02	*Not quantified (c)*		

Notes:

Total hazard index presented. Shading indicates that one or more target organ specific hazard indices exceed one.

(a) Cumulative noncancer hazards differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented are those based on the KM TEQ calculator.

(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.

(c) Workers are not expected to have contact with surface water during outdoor activities.

Table ES-4
Summary of Receptor/Exposure Pathway Noncancer Hazards for NBSA Baseline Human Health Risk Assessment (a)
Central Tendency Exposure (CTE)

Receptor Population	Age Group	Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		4E+00	5E+00
	Adolescent	4E-02	7E-04	2E+00	3E+00
	Adult	4E-02	5E-04	2E+00	3E+00
Swimmer	Child	4E-02	5E-03	*Pathways Incomplete*	
	Adolescent	3E-02	7E-03		
	Adult	1E-02	2E-03		
Wader	Child	4E-02	4E-04		
	Adolescent	3E-02	5E-04		
	Adult	1E-02	1E-04		
Boater	Child	*Pathways Incomplete*			
	Adolescent	3E-02	5E-03		
	Adult	4E-03	3E-03		
Worker	Adult	3E-02	*Not quantified (c)*		

Notes:

Total hazard index presented. Shading indicates that one or more target organ specific hazard indices exceed one.

(a) Cumulative noncancer hazards differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented are those based on the KM TEQ calculator.

(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.

(c) Workers are not expected to have contact with surface water during outdoor activities.

Fish Consumption

The cumulative potential cancer risk for the RME combined adult/child angler/sportsman who routinely consumes a mixed diet of self-caught fish over a period of 26 years is 8×10^{-4}, regardless of TEQ approach. The primary contributors to the RME cumulative potential cancer risks are 2,3,7,8-TCDD, which contributes approximately 28% (33% or 34% for all PCDD/Fs, depending on TEQ approach); PCB-126, which contributes approximately 31% (36 or 38% for all DL-PCBs, depending on TEQ approach); and non-DL PCBs, which contributes approximately 18 or 19%, depending on TEQ approach. Minor contributors to the cumulative cancer risk include pesticides (approximately 5%) and inorganic arsenic (approximately 4%); however, these risks are within or below the NCP risk range. Potential cancer risks associated with direct contact with accessible surface sediment or surface water are below the NCP risk range for the RME scenario.

The cumulative potential noncancer HI for the RME child angler who routinely consumes fish from the NBSA is 40, regardless of TEQ approach. As with excess cancer risk, the primary contributors to the cumulative potential HI are 2,3,7,8-TCDD, which contributes approximately 19% (22% or 23% for all PCDD/Fs, depending on TEQ approach); PCB-126, which contributes approximately 21% (24% to 26% for all DL-PCBs, depending on TEQ approach); and non-DL PCBs, which contribute approximately 32% or 33%, depending on TEQ approach. The highest target-organ-specific HI is 20 for reproductive effects (DLCs), regardless of TEQ approach. The next highest target-organ-specific HI is 10 for whole-body effects (non-DL PCBs), regardless of TEQ approach. Liver (pesticides) and neurological effects (methyl mercury) are the only other target-organ-specific HIs greater than 1 (5 and 2, respectively).

The cumulative potential cancer risks for the CTE scenario for mixed fish diet are within the NCP risk range. For noncancer HIs, the only CTE target organ-specific HI greater than 1 is for reproductive effects (DLCs), where the HI is 2, regardless of TEQ approach.

Crab Consumption

The cumulative potential cancer risk for the RME combined adult/child angler/sportsman who routinely consumes a diet of self-caught crab muscle and hepatopancreas over a period of 26 years is also 8×10^{-4}, regardless of TEQ approach. The primary contributors to the RME cumulative potential cancer risks are 2,3,7,8-TCDD, which contributes approximately 52% (59% or 60% for all PCDD/Fs, depending on TEQ approach); PCB-126, which contributes approximately 19% (23 or 24% for all DL-PCBs, depending on TEQ approach); and non-DL PCBs, which contributes approximately 8%, regardless of TEQ approach. Minor contributors to the cumulative cancer risk include inorganic arsenic (approximately 6%) and pesticides (approximately 2%); however, these risks are within or below the NCP risk range. Potential cancer risks associated with direct contact with accessible surface sediment or surface water are below the NCP risk range for the RME scenario.

The cumulative potential noncancer HI for the RME child angler who routinely consumes muscle and hepatopancreas from the NBSA is 30, regardless of TEQ approach. As with excess cancer risk, the primary contributors to the cumulative potential HI are 2,3,7,8-TCDD, which contributes approximately 44% (51% for all PCDD/Fs, regardless of TEQ approach); PCB-126, which contributes approximately 16% (20% for all DL-PCBs, regardless of TEQ approach); and non-DL PCBs, which contribute approximately 19%, regardless of TEQ approach. The highest target-organ-specific HI is 20 for reproductive effects (DLCs), regardless of TEQ approach. The next highest target-organ-specific HI is 7 for whole-body effects (non-DL PCBs), regardless of TEQ approach. The remaining target-organ-specific HI are equal to or less than 1.

The cumulative potential cancer risks for the CTE scenario for a crab muscle and hepatopancreas diet are within the NCP risk range. For noncancer HIs, the only CTE target organ-specific HI greater than 1 is for reproductive effects (DLCs), where the HI is 4, regardless of TEQ approach.

Direct Contact with Sediment and Surface Water

Cumulative potential cancer risks and noncancer HIs associated with direct contact with accessible surface sediment and surface water in the NBSA while angling, swimming, wading, or boating, are within or below the NCP risk range of 10^{-6} to 10^{-4} and the noncancer protection goal of a HI of 1.

ES.2.5 Identification of Potential Chemicals of Concern

Potential COCs were identified in cases where the potential cumulative cancer risk or noncancer HI for a receptor exceeds 10^{-4} or 1, respectively. In these cases, potential COCs were any COPC with an individual pathway cancer risk greater than 10^{-6} or noncancer HI greater than 0.1. The following table summarizes the potential COCs for the RME scenario (no potential COCs were identified for surface water for either the RME or CTE scenario).

Potential COC	Accessible Surface Sediment	Mixed Fish Diet	Crab Muscle and Hepatopancreas
Dioxin-like Compounds			
2,3,7,8-TCDD		X	X
1,2,3,7,8-PeCDD		X	X
1,2,3,6,7,8-HxCDD		X	
2,3,7,8-TCDF		X	X
1,2,3,7,8-PeCDF		X	X
2,3,4,7,8-PeCDF		X	X
1,2,3,4,7,8-HxCDF		X	X
1,2,3,6,7,8-HxCDF		X	X
Total PCDD/Fs (excluding KM TEQ)		X	X
Total PCDD/Fs (based on KM TEQ)		X	X
PCB-77		X	X
PCB-105		X	X
PCB-118		X	X
PCB-126		X	X
PCB-156/157		X	X
PCB-167		X	
PCB-169		X	X
Total DL-PCBs (excluding KM TEQ)		X	X

Potential COC	Accessible Surface Sediment	Mixed Fish Diet	Crab Muscle and Hepatopancreas
Total DL-PCBs (based on KM TEQ)		X	X
Non-DL PCBs			
Total Non-DL PCBs		X	X
PAHs			
Benzo(a)pyrene		X	
Dibenz(a,h)anthracene		X	
Pesticides & Organics			
2,4'-DDD		X	
4,4'-DDD		X	X
4,4'-DDE		X	X
Chlordane, alpha (cis)		X	
Dieldrin		X	X
Heptachlor epoxide, cis-		X	X
Heptachlor epoxide, trans-			X
Nonachlor, trans-		X	X
Pyridine		X	X
Inorganics			
Arsenic, inorganic	X	X	X
Cadmium			X
Cobalt		X	X
Copper			X
Mercury		X	X
Methyl Mercury		X	X

ES.3 Conclusions

Fish and Crab

Consumption of self-caught fish or crab from the NBSA presents the primary source of potential risk to human health. For the RME scenario, which is intended to represent an upper bound of exposure, the potential cancer risk and noncancer hazards to anglers/sportsman who are assumed to routinely consume their catch (34.6 g/day for an adult and 11.5 g/day for a child for fish, or 21 g/day for an adult and 7 g/day for a child for crab, over a period of 26 years) exceed the NCP risk range of 10^{-6} to 10^{-4} and a noncancer protection goal of an HI of 1. The RME cancer risk for the combined adult/child angler/sportsman is 8×10^{-4} for both fish and crab consumption, and the noncancer HIs for the child angler/sportsman are 40 for fish consumption and 30 for crab consumption.

For the CTE scenario, which is based on average exposure levels (3.9 g/day for an adult and 1.3 g/day for a child for fish, or 3 g/day for an adult and 1 g/day for a child for crab, over a period of 12 years), the potential cancer risks for the combined adult/child angler/sportsman who consumes fish or crab from the NBSA are within the NCP risk range; however, noncancer HIs for the child angler/sportsman are above the noncancer protection goal (i.e., 4 for fish consumption and 3 for crab consumption).

The primary COPCs for fish and crab ingestion are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs, with some pesticides, inorganic arsenic, and/or methyl mercury also contributing to the cumulative risks/hazards for both the RME and CTE scenarios.

As discussed in Section 7.3.3, there is considerable uncertainty in the TEFs for DL compounds, particularly for some of the DL-PCBs. Consistent with USEPA (2010a), a sensitivity analysis was conducted to illustrate the impact of the TEFs on the overall risk estimates and percent contribution of individual congeners or groups of congeners. For all congeners except 2,3,7,8-TCDD, the lower- and upper-bound TEFs were the 10^{th} and 90^{th} percentiles from *in vitro* and *in vivo* studies included in the relative effects potency (ReP) database (USEPA 2010a). The TEF for 2,3,7,8-TCDD remains constant in all scenarios. Accordingly, while the estimated risk for 2,3,7,8-TCDD remains constant, the contribution to risk can change, as well as the relative contribution of all PCDD/Fs, all DL-PCBs, and all PCBs (non-DL and DL-PCBs). For example, for the combined adult/child angler/sportsman who consumes a mixed fish diet, the percent contribution for 2,3,7.8-TCDD increases from 28% to 44% when using the lower-bound TEFs, but decreases to only 1% when using the upper-bound TEFs. Conversely, the percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 37% when using lower-bound TEFs to 98% when upper-bound TEFs are used. Similarly, for crab muscle and hepatopancreas consumption, the percent contribution of 2,3,7,8-TCDD increases from 52% to 70% when using the lower-bound TEFs, but decreases to approximately 2% when using the upper-bound TEFs. The percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 16% when using lower-bound TEFs to 96% when upper-bound TEFs are used (see Section 7.3.3).

The specific species or tissue type(s) that make up a fish or crab diet can influence the estimated risk, because some species or tissue types have been shown to have higher tissue burdens of bioaccumulative chemicals than others. Fillet data were collected for the following five fish species from the NBSA: American eel, bluefish, striped bass, summer flounder, and white perch. The estimated cancer risks associated with consumption of any combination of these fish species exceed the NCP risk range for the RME scenario, but not the CTE scenario. The estimated noncancer HIs exceed the noncancer protection goal of an HI of 1 for both the RME and CTE scenarios. Importantly, the estimated cancer risks associated with consumption of crab muscle only are approximately a factor of 6 lower than for muscle and hepatopancreas combined, and are within the NCP risk range, even for the RME scenario. For noncancer effects, the noncancer HIs for a muscle-only diet are also approximately a factor of 6 lower than for muscle and hepatopancreas combined, but remain above the noncancer goal even for the CTE scenario.

Sediment and Surface Water

The cumulative potential cancer risks and noncancer HIs associated with direct contact with accessible surface sediment and surface water in the NBSA while angling, swimming, wading, or boating are much lower than those associated with fish or crab consumption and are within or below the NCP risk range of 10^{-6} to 10^{-4} and noncancer protection goal of an HI of 1.

1. Introduction

The Baseline Human Health Risk Assessment for the Newark Bay Study Area, referred to herein as the Baseline Human Health Risk Assessment (BHHRA), has been prepared as part of the Newark Bay Study Area (NBSA) remedial investigation/feasibility study (RI/FS). The BHHRA and RI/FS are being conducted by Glenn Springs Holdings, Inc. (GSH), on behalf of Occidental Chemical Corporation (the successor to Diamond Shamrock Chemicals Company [formerly known as Diamond Alkali Company]) pursuant to the Administrative Order on Consent (AOC) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA Index 02-2004-2010; USEPA 2004a). The BHHRA meets the requirements of the AOC and National Contingency Plan (NCP) (USEPA 1990). This report describes the approach, methods, and assumptions used by GSH to conduct the BHHRA, in accordance with U.S. Environmental Protection Agency (USEPA) risk assessment guidance (USEPA 1986a, 1989, 1991a, 1991c, 1991d, 2001a, 2003a, 2004b, 2005b, 2005c, 2009a, 2011, 2014). The BHHRA is also consistent with the Revised Pathways Analysis Report (Revised PAR) for the NBSA (Battelle 2018). This report addresses comments and revisions provided by USEPA, USEPA review of responses to comments, and agreed-upon resolutions (USEPA 2017a, 2017b, 2017c, 2018a, 2018b, 2018c).

1.1 Background on NBSA Baseline Risk Assessment Planning

Several documents have been prepared that support the BHHRA for the NBSA. These include:

- Risk Assessment Scoping, Newark Bay Study Area Remedial Investigation, Baseline Human Health/Ecological Risk Assessment Workshop (Arcadis 2011)
- Newark Bay Study Area Problem Formulation for Baseline Human Health and Ecological Risk Assessment (Tierra Solutions, Inc. [Tierra] 2013)
- Quality Assurance Project Plans (QAPPs) developed for field sampling programs, including sediment, surface water, and tissue chemistry (Tierra 2014a, 2014b, 2015b; AECOM 2012a)
- Newark Bay Study Area Reconnaissance Survey Report. Baseline Human Health and Ecological Risk Assessment (Tierra 2015a)
- Proposed Risk Assessment Field Sampling and Analysis Program – Newark Bay Study Area (Arcadis 2015)
- Final Newark Bay Study Revised Pathways Analysis Report (Battelle 2018)
- Conceptual Site Model, Newark Bay Study Area, Revision 3 (GSH 2019)

In addition, the BHHRA has been conducted in accordance with USEPA risk assessment guidance, including but not necessarily limited to:

- Risk Assessment Guidance for Superfund (RAGS) – Human Health Evaluation Manual (Parts A through F) (USEPA 1989, 1991a, 1991c, 2001a, 2004b, 2009a)
- Human Health Evaluation Manual, Supplemental Guidance: “Standard default exposure factors (USEPA 1991b)
- Guidance for Exposure Assessment (USEPA 1992a)
- Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (USEPA 2002a)

- Human Health Toxicity Factors in Superfund Risk Assessments (USEPA 2003a)
- Guidelines for Carcinogen Risk Assessment and Supplemental Guidance for Assessing Susceptibility from Early-Life Exposures to Carcinogens (USEPA 2005b, 2005c)
- Exposure Factors Handbook (USEPA 2011)
- Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors (USEPA 2014)
- ProUCL Version 5.1 Technical Guide. Statistical Software for Environmental Applications for Datasets with and without Nondetect Observations (USEPA 2015a)
- Regional Screening Levels (USEPA 2018d)

1.2 Organization of BHHRA

The BHHRA was conducted in accordance with USEPA's four-step risk assessment paradigm (USEPA 1989):

- Data evaluation and hazard identification
- Exposure assessment
- Toxicity assessment
- Risk characterization.

The BHHRA report is organized as follows to address each of these steps:

- Section 2 — Site Characterization
- Section 3 — Data Evaluation and Hazard Identification
- Section 4 — Exposure Assessment
- Section 5 — Toxicity Assessment
- Section 6 — Risk Characterization
- Section 7 — Uncertainty Evaluation
- Section 8 — Summary and Conclusions
- Section 9 — References.

Tables and figures for each section are presented at the end of the text. The USEPA's RAGS Part D tables are split between report tables and appendices as outlined below.

RAGS Part D Table	BHHRA Table Number or Location	Table Title
Table 1	Table 4-1	Selection of Exposure Pathways
Table 2	Tables 3-8 to 3-10	Occurrence, Distribution, and Selection of Chemicals of Potential Concern
Table 3	Tables 4-14 to 4-18	Exposure Point Concentration Summary
Table 4	Tables 4-2 to 4-11	Values Used for Daily Intake Calculations
Table 5	Table 5-1	Non-Cancer Toxicity Data – Oral/Dermal
Table 6	Table 5-2	Cancer Toxicity Data – Oral/Dermal
Table 7	Appendix F	Calculation of Chemical Risks and Non-Cancer Hazards
Table 9[a]	Appendix G	Summary of Receptor Risks and Hazards for COPCs
Table 10	Appendix I	Risk Summary

[a] RAGS Part D Table 8, Calculation of Radiation Cancer Risks, is not applicable to the NBSA.

2. Site Characterization

The Diamond Alkali Superfund Site, which borders the Passaic River (Figure 2-1), was added to the Superfund National Priorities List on September 21, 1984, because of contaminants present at the site and in the river. Four different operable units (OUs) are associated with the site today and are shown on Figure 2-1: the former manufacturing plant and surrounding properties at 80 and 120 Lister Avenue (OU1), the lower 8.3 miles of the Passaic River (OU2), the Newark Bay Study Area (NBSA; OU3), and the lower 17 miles of the Passaic River (OU4; USEPA 2016). The NBSA is the focus of this report. As noted, GSH is conducting an RI/FS for the NBSA. The data and information necessary to complete the BHHRA have been collected.

2.1 Site Setting

Newark Bay (the Bay) is a 6.3-square-mile enclosed embayment on the western side of the New York/New Jersey (NY/NJ) Harbor Estuary. The Bay is adjacent to four large cities (Newark, Elizabeth, Bayonne, and Jersey City), and is fringed on its western side by port facilities, industrial facilities, and Newark Liberty International Airport. On its northern side, the Hackensack and Passaic Rivers flow into the Bay, while on the southern side, the Bay is connected to New York Harbor (NY) and Raritan Bay (NJ) through two tidal straits: Kill van Kull and Arthur Kill, respectively. The NBSA has been defined as the Bay and portions of key tributaries, including the Hackensack River, Arthur Kill, and Kill van Kull (Figures 2-1 and 2-2). The Passaic River is not included in the definition of the NBSA, because it is currently being investigated as a separate OU. However, investigations of the Passaic River and NBSA OUs are being conducted in a comparable manner and with careful consideration of their linkages for the purposes of CERCLA management decision making, and broader environmental management considerations (GSH 2019).

Newark Bay is central to one of the most urbanized and industrialized areas in the United States. It has experienced more than two centuries of environmental degradation that is attributable to many factors, including shoreline and land development (U.S. Army Corps of Engineers [USACE], 2006), wetlands/habitat loss, garbage and sewage disposal, dredging and dredged material disposal, and releases of contaminants from a variety of sources and locations (Iannuzzi et al. 2002).

2.1.1 Site Background

The environmental history of the Bay parallels the development of the New York City metropolitan area. Most shipping and economic development in the 19th century clustered around Manhattan and Brooklyn, but as the pace of development quickened in the first half of the 20th century, the Bay eventually supplanted Manhattan as the primary port by mid-century. Over that period, approximately 80% to 90% of the pre-existing shoreline of the Bay was developed, and ecological habitats correspondingly diminished (Iannuzzi et al. 2002; USACE 2009). A mid-19th century bathymetric map (Hassler 1844) depicts a shallow Bay (controlling depth less than 10 feet) that was bordered on the west and north by extensive wetlands (GSH 2019).

The Bay has been the site of myriad industries for more than two centuries (Meyers 1945; Cunningham 1954; Brydon 1974; Iannuzzi et al. 2002). The development of the port system required extensive land development, achieved through “reclamation” of the meadowlands (wetlands) along the Bay and the Hackensack River during the 20th century. As the area’s population and industrial development grew, transportation needs increased, and a large network of roads, bridges, airports, and port facilities was constructed.

The NBSA is known to be contaminated with a wide variety of organic compounds and inorganic chemicals (i.e., polychlorinated biphenyls [PCBs], polychlorinated dibenzo-p-dioxins and furans [PCDD/PCDFs], polycyclic aromatic hydrocarbons [PAHs], pesticides, herbicides, semivolatile organic compounds [SVOCs], volatile organic compounds [VOCs], inorganics/metals, and other organic compounds). As conceptualized in Figure 2-1, there are many known sources of contaminants to the Bay, including:

- Industrial discharges
- Publicly owned treatment works (POTWs), combined sewer overflows (CSOs), storm sewers, and other non-point sources
- Spills, leaks, and accidental discharges from marine and industrial sources
- Atmospheric deposition and groundwater discharges
- Tributary inputs from each of the sources listed, and transport of re-mobilized legacy sediments from tributaries.

Existing contamination in the NBSA is primarily from historical and current sources from each of these categories, which in combination have been released over more than a century, paralleling the urban and industrial history of the Bay. The relative influence or importance of these various sources is not easily quantifiable, and likely varies depending on the geographic area, COC group, temporal fate and transport processes, and the depth of the contaminated sediment layer under consideration. Additional information regarding sources of contaminants in the Bay is provided in the Report on Investigation of Sources of Pollutants and Contaminants (Tierra 2006).

2.2 Human Use of the Bay

Human use of the NBSA is primarily industrial and commercial. Recreational use is more limited due to access limitations from the shoreline types (i.e., bulkhead, bridges, sheet piling, and mudflats) and surrounding urban/industrial/commercial land use. Access for recreation is through available public access areas and pleasure boating (i.e., from marinas inside and outside of the NBSA). The likely current and future human users of the NBSA include recreational users (waders, swimmers, and boaters), anglers/sportsmen, workers, and residents and transients. These populations may be exposed to contaminants through direct contact with near-shore sediments and/or surface water during recreational activities, such as fishing, boating, working, or wading. They may also incidentally ingest contaminants from sediment and/or surface water during these activities. The most significant pathway by which people may be exposed to contaminants in the NBSA is expected to be from consuming fish and/or crab. Human use of the NBSA shoreline is depicted on Figure 2-3 and is categorized as follows (Tierra 2015a):

- Disturbed Uplands — 18%
- Undisturbed Uplands — 26%
- Industrial/Commercial — 36%
- Recreational — 12%
- Residential — 11%.

Monitoring and research since the mid-1970s have resulted in the State of New Jersey taking several steps, including consumption advisories, closures, and bans on fish sales, to limit the exposure of the fish-eating public to toxic contaminants in the Bay. Consumption advisories still exist today in the northeast region of New Jersey for certain fish species, and the general public is advised not to eat American eel or white perch from the NBSA. Harvest and consumption of blue crab from the NBSA is banned (NJDEP and NJDOH 2018). There is also an advisory warning the public against any consumption of Newark Bay crab, American eel, and white perch, and limited consumption of striped bass (four meals per year) and white catfish (one meal per year) (NJDEP and NJDOH 2018).

Some consumption of fish and crab from the Bay has been reported, despite the advisories and ban (Pflugh et al. 1999). People catch and consume fish and crab in the Bay, including species identified in the advisories. This has been reported along the Bayonne waterfront on the eastern side of the Bay; on the pilings of the Central Railroad of New Jersey/Newark Bay Bridge (also known as Old Bay Bridge), which was demolished in the 1980s; and at other piers, exposed rocky shorelines, pilings, and docks (Anglerweb.com, accessed April 27, 2017).

3. Data Evaluation and Hazard Identification

The purpose of the data evaluation and hazard identification process is two-fold: (1) evaluate the nature and extent of chemicals present in environmental media in the NBSA, and (2) identify chemicals of potential concern (COPCs) for further evaluation in the quantitative risk assessment. This step entails compiling and summarizing the data relevant to the BHHRA and identifying COPCs via a series of screening steps.

3.1 Data Evaluation

Several programs to collect samples of various environmental media have been conducted within the NBSA, including surface sediment sample collection, surface water sample collection, and collection of fish and crab tissues (biota). The data evaluated as part of the BHHRA were collected in accordance with USEPA-approved QAPPs (Crab-Clam QAPP, Tierra 2014a; Fish QAPP, Tierra 2014b; Sediment Quality Triad [SQT] QAPP, Tierra 2015b; SV-CWCM QAPP, AECOM 2012a), and data reports for each element of the program have been prepared and submitted (Crab-Clam Data Report, GSH 2017a; Fish Data Report, Tierra 2017; SQT Data Report, GSH 2017b; Surface Water Report, AECOM 2014). The data sets evaluated as part of the BHHRA are described below.

Validation of the data was performed according to procedures specified in the applicable QAPPs. Validation qualifiers were assigned to data based on criteria in the applicable data validation guidelines. All data that qualified as usable for their intended purposes, including risk assessment, were used in the COPC selection process, following USEPA (1989) guidance. Data rejected during data qualification (R-qualified) were excluded from evaluation in the BHHRA; however, data that were non-detect (U-qualified) and estimated (J-qualified) were included. Tables containing all analytical data used in the BHHRA are included in Appendix A, as well as a summary of the data validation and findings with regard to data usability in the BHHRA. Data analysis was performed using R (R Core Team 2018) and Microsoft Excel.

3.1.1 Surface Sediment Data Set

The BHHRA includes surface sediment sample data from the following sampling programs between 2014 and 2015:

- Crab and Clam Sampling and Analysis Program (Crab/Clam) (September–October 2014)
- Sediment Quality Triad and Porewater Sampling and Analysis Program (SQT) (September 2015).

To assess the impact of direct human contact with sediment (dermal and incidental sediment ingestion), sediment samples at human-accessible points along the shoreline are evaluated. Accessible surface sample locations are defined in Table 2 of the SQT QAPP (Tierra 2015b; see Attachment A-5 to Appendix A). The BHHRA includes sediment sample data from 16 accessible locations from the Crab/Clam program (including 1 field duplicate for a total of 17 samples), and 23 accessible locations from the SQT program (including 1 field duplicate for a total of 24 samples) (see Figure 3-1). Additional sediment samples were collected in the Phase III Sediment Investigation; however, because none of the locations were considered accessible by USEPA, no samples from this investigation were evaluated as part of the BHHRA.

In accordance with the SQT QAPP (Tierra 2015b), each sediment sample was analyzed for contaminants, including polychlorinated dibenzo(p)dioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs) (209 individual congeners and Aroclors), metals (including mercury, methyl mercury, hexavalent chromium, and titanium), semivolatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), pesticides, herbicides, butyltins/organotins, total petroleum hydrocarbons (TPH), ammonia, phosphorus, sulfide, and cyanide.

In the accessible surface sediment samples, several metals were measured using two analytical methods: cadmium, copper, lead, mercury, nickel, and zinc were measured using both USEPA Method 6010 and USEPA Method 6020. The HHRA uses only the results from USEPA Method 6020. Table 3-1 identifies the number of samples analyzed for each contaminant by sampling program and by analytical method. Table 3-2 identifies the specific sediment surface samples included in the COPC selection process (see Section 3.3).

In 2017, comparison of sediment chemistry results between split samples analyzed by USEPA and Tierra Solutions, Inc., (Tierra) indicated that Tierra's results for PCBs and PAHs in samples from the SQT and Crab/Clam programs appeared to be biased low (LBG 2017). At USEPA's request, the sediment samples were reanalyzed for PCBs and PAHs after implementing corrective action on the relevant analytical methods. The results of the reanalysis were considered comparable to USEPA's results. For the BHHRA, the original results for PCBs and PAHs in sediment samples were discarded, and the reanalyzed results were used in their place.

3.1.2 Surface Water Data Set

The BHHRA includes data from the Small Volume (SV) Chemical Water Column Monitoring (CWCM) Sampling Program, performed as part of the RI/FS for the Lower Passaic River Study Area (LPRSA) (AECOM 2014). SV-CWCM sample and data collection were conducted during five rounds of routine sampling (August 2011, February 2012, March 2012, June 2012, December 2012), and two high-flow sampling events, when the flow through Dundee Dam was greater than 3,000 cubic feet per second (February/March 2013, June 2013). Samples were collected at 17 locations throughout the Lower Passaic River Study Area; however, the HHRA includes samples from only six locations within Newark Bay proper (see Figure 3-2). (The SV-CWCM also included a low-flow/spring tide sampling event; however, none of the samples collected during this event were collected from locations within Newark Bay, and they were therefore excluded from the BHHRA.) Samples were collected from each location at two depths: 3 feet from the surface and 3 feet from the bottom. To reflect likely human interaction with surface water (i.e., wading, swimming, or boating), the BHHRA evaluated only samples that were taken at a depth of 3 feet or less (depth rounded to a single significant figure).

The following table summarizes the number of Newark Bay locations and surface water samples collected during each sampling event.

Sampling Event	Date	Number of Newark Bay Locations	Number of Samples at Depth ≤ 3 feet
Round 1	August 2011	4	16
Round 2	February 2012	5	19
Round 3	March 2012	5	19
Round 4	June 2012	6	19
Round 5	December 2012	5	20
High Flow 1	February/March 2013	5	19
High Flow 2	June 2013	5	19

As documented in the Draft SV-CWCM Report (Table 2-2), not all samples were analyzed for all contaminants (see also Appendix A, AECOM 2014). The following analytes were monitored in every event: PCDD/Fs, PCB congeners and homologs, mercury, cadmium, copper, lead, sulfide, and chloride. The following analytes were monitored in only three routine sampling events and one high-flow sampling event: SVOCs, VOCs, metals, titanium, methyl mercury, hexavalent chromium, butyltins, pesticides, cyanide, PAHs, ammonia, and total phosphorus.

For metals and methyl mercury, both total and dissolved-fraction concentrations were measured. Only the total concentration was included in the BHHRA. Hexavalent chromium was measured as a dissolved-fraction concentration only; therefore, the dissolved-fraction concentration was included in the HHRA.

PAHs were measured using two different methods: USEPA Method 8270C and a GC/MS-SIM method, KNOX-ID-0016. The GC/MS-SIM method yields improved detection limits compared to USEPA Method 8270C. When both measurements were available for the same PAH in the same sample, the BHHRA included only the results from Method KNOX-ID-0016. Otherwise, when only one measurement was available for a given PAH in a given sample, that measurement was used regardless of method.

The metals arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, silver, thallium, and zinc were also measured using two different methods: USEPA Method 6020 and USEPA Method 200.8. Each sample was analyzed using only one of the two methods. Results were used in the HHRA regardless of method.

Hexachlorobenzene was also measured using two different methods: USEPA Method 8270C and a modified version of USEPA Method 1699. The modified version of USEPA Method 1699 results in improved detection limits; therefore, in samples analyzed using both methods, the BHHRA used only the results from modified USEPA Method 1699. No samples were analyzed using only USEPA Method 8270C, and there was one sample analyzed using only modified USEPA Method 1699.

Table 3-3 identifies the number of samples analyzed for each contaminant by sampling program and by analytical method. Table 3-4 identifies the specific surface water samples included in the COPC selection process (see Section 3.3).

3.1.3 Fish and Crab Tissue Data Set

The BHHRA includes data from the crab and fish tissue collection programs conducted in the NBSA. Fish sampling activities were conducted within the three Newark Bay geographic zones (north, central, and south) during three fish sampling events: fall 2014, spring/summer 2015, and spring 2016 (see Figures 3-3 through 3-5). Blue crab sampling activities were conducted in September and October of 2014. Blue crab samples were collected from 12 Intertidal Areas; further blue crab samples were collected from each of the three Newark Bay geographic zones (eight locations in North, eight locations in Central, and nine locations in South Newark Bay) (see Figure 3-6).

The HHRA includes data only on fish species from which fillet samples were collected: American eel, bluefish, striped bass, summer flounder, and white perch. Blue crab tissue samples included separate muscle and hepatopancreas samples. Although no combined muscle/hepatopancreas samples were collected directly, combined muscle/hepatopancreas results were calculated mathematically from the separate muscle and hepatopancreas results for each analyte. Specifically, muscle and hepatopancreas samples collected at the same location at the same time are from the same crab. Based on an assessment of these data, it was estimated that 74% of the combined tissue mass for each crab was composed of muscle, and 26% was composed of hepatopancreas, such that the combined value was a weighted average of the separate muscle and hepatopancreas values, with weight 0.74 for muscle and 0.26 for hepatopancreas (see Attachment A-6 to Appendix A). Although blue crab carcass samples were collected, these were not analyzed as part of the BHHRA, because they are not considered relevant to human ingestion patterns.

The following table summarizes the number of tissue samples, including field duplicates, collected for each fish species and crab tissue type.

Matrix	Species	Tissue	Number of Samples	Number of Field Duplicates
Fish	American Eel	Fillet	18	0
Fish	Bluefish	Fillet	18	0
Fish	Summer Flounder	Fillet	18	0
Fish	White Perch	Fillet	22	4
Fish	Striped Bass	Fillet	21	3
Crab	Blue Crab	Hepatopancreas	37	0
Crab	Blue Crab	Muscle	37	0

In accordance with QAPPs (Tierra 2014a, 2014b), fish and crab tissue samples were analyzed for contaminants that included PCDD/Fs, PCBs (as congeners and Aroclors), metals (including methyl mercury, mercury, and titanium), SVOCs (including phthalates and alkylated PAHs), lipids, percent moisture, pesticides (excluding toxaphene), and butyltins. In fish fillet and crab muscle/hepatopancreas samples, each analyte was measured using only one method. Table 3-5 identifies the number of samples for each analyte by analytical method and by fish species or crab tissue type. Table 3-6 identifies the specific fish and crab tissue samples included in the COPC selection process (see Section 3.3).

For all species and tissues, arsenic was analyzed as total arsenic. Because only the inorganic form of arsenic is considered particularly toxic to humans, speciation of inorganic/organic arsenic in fish and crab tissue was estimated as follows: 10% of total arsenic was assumed to be inorganic arsenic, and the remaining 90% was assumed to be organic arsenic (see Section 5.5.4).

3.2 Hazard Identification

The main purpose of the hazard identification step is to identify COPCs as a subset of all chemicals detected in each medium (surface water, sediment, and fish/crab tissue). The hazard identification step enables the chemicals detected in each medium to be divided into two groups:

1. Chemicals that have negligible potential for adverse effects to humans and therefore do not need to be evaluated further.

2. Chemicals that have potential for adverse effects to humans and therefore require further evaluation—these are the COPCs.

3.2.1 Summary Statistics

For purposes of COPC selection, data for each medium were summarized, including frequency of detection, minimum and maximum detected concentrations, and range of detection limits. Details of the approach used to summarize the data by medium and chemical are provided below. As noted previously, results that were rejected during data validation (flagged “R”) were not included in the data summary, because these data are not usable for risk assessment (USEPA 1989). Only a small percentage of the data were rejected, as discussed in the uncertainty evaluation (see Section 7).

Treatment of co-eluting PCB congeners: Several PCB congeners were identified by the analytical laboratories as co-eluting congeners (see Table 3-7). Results for these co-eluting congeners represent the combined concentration for all congeners in the co-eluting set. They are identified in tables of results using the list of all co-eluting congeners separated by forward slashes, e.g. “PCB-156/157” or “PCB-86/87/97/109/119/125.”

Treatment of non-dioxin-like PCBs: Non-dioxin-like PCBs (non-DL PCBs) were not evaluated individually as possible COPCs. Rather, a total value for non-DL PCBs was calculated by summing the reported concentrations of all non-DL PCBs for each sample. This total non-DL PCB value was assigned qualifier J (estimated) if any of the non-DL PCBs had qualifier J or no qualifier; if all of the non-DL PCBs had qualifier U (non-detect), then the total non-DL PCB value also was assigned qualifier U.

Toxicity equivalence values: For PCDD/Fs, and separately for DL PCBs, toxicity equivalence (TEQ) values were computed for each sample using two methods. First, USEPA's Kaplan-Meier TEQ (KM TEQ) calculator was used (Version 9.1; issued July 2014), which assigns each congener its toxic equivalency factor (TEF) and sums them, statistically accounting for congeners with measured values below the limit of detection. As implemented in the KM TEQ calculator, if more than 50% of the KM TEQ is contributed by samples with U or J qualifiers, then the resulting KM TEQ is assigned qualifier J (estimated); otherwise, the resulting KM TEQ is assigned no qualifier.

Treatment of duplicates: There were two field duplicates in the sediment data (one from Crab/Clam and one from SQT investigations), and seven field duplicates in the fish fillet data. There were no field duplicates in the surface water data or the blue crab tissue data. For COPC identification, field duplicate sample results were treated as independent samples.

Minimum concentration: The minimum reported concentration for each chemical across all samples was determined, along with its qualifier (i.e., "U" for non-detect, "J" for estimated detect, or no qualifier for measured detect).

Maximum concentration: The maximum reported concentration for each chemical across all samples was determined, along with its qualifier (i.e., "U" for non-detect, "J" for estimated detect, or no qualifier for measured detect).

Location(s) of maximum concentration: The location identifier(s) for samples with the maximum concentration were reported. In sediment and biota (fish/crab) data sets, the maximum concentration occurred at multiple locations; all of these locations were reported as a list. For the fish data set, location was identified as the geographic zone within Newark Bay (North, South, or Central). For crab data, a general and a specific location were identified. The general location was the geographic zone within Newark Bay (North, South, or Central). The specific location was given by the station identifier for the 12 Intertidal Area locations where a station identifier was available, or by the specific sample number within each geographic zone for the 25 samples that did not have specific coordinate information for sample location. For surface water and sediment data sets, the locations were identified using the station identifiers for each data set.

Detection frequency: For each chemical, the percentage of samples in which the measured value was above the detection limit was reported.

Range of detection limits: For each chemical, the range of reported detection limits across samples was reported. Detection limit may vary from sample to sample. Importantly, the minimum detection limit does not necessarily occur in the same sample as the minimum reported concentration, and the maximum detection limit does not necessarily occur in the same sample as the maximum reported concentration.

The data summaries for accessible surface sediment, surface water, fish tissue, and crab tissue are presented in Tables 3-8 through 3-11 (RAGS Part D Tables 2.1 to 2.4).

3.3 Method for COPC Selection

COPCs for the human health assessment were determined from sediment, surface water, and fish/crab tissue. COPCs were identified through a process that involved (1) identification of compounds classified by USEPA as a known human carcinogen, (2) evaluation of detection frequency, (3) identification of essential nutrients, and (4) comparison of the maximum concentration to risk-based screening values. A summary of the screening process is provided in Figure 3-7. Each of the key steps is outlined below.

3.3.1 Carcinogen Status

Chemicals detected in the historical data classified by USEPA as known human carcinogens (NTP 2016) were retained as COPCs, regardless of frequency of detection or detected concentration. In addition, those chemicals that were not detected in any sample, but have been classified as a known human carcinogen, were included in the uncertainty evaluation.

3.3.2 Frequency of Detection

Chemicals detected in less than 5% of the samples were eliminated from further consideration as COPCs unless identified as a known human carcinogen (see Section 3.3.1). However, those chemicals that were either (1) detected in less than 5% of the samples or (2) not detected in any sample, but had maximum concentrations (detect or non-detect value) above the risk-based screening value (see Section 3.3.4), were included in the uncertainty evaluation.

3.3.3 Essential Nutrient Status

Inorganic constituents considered to be "essential nutrients," which are not likely to be toxic at anticipated environmental levels, were excluded from consideration as COPCs. These included calcium, chloride, magnesium, phosphorus, potassium, and sodium.

3.3.4 Toxicity (Risk-Based) Screening

The maximum concentrations of all constituents that were detected in greater than 5% of the samples, except for known carcinogens and essential nutrients, were screened against a hierarchy of risk-based values for soil, tap water, and fish tissue. If no screening level was available, a surrogate chemical was identified, if possible, based on similarity in physical and chemical structure. Constituents with maximum concentrations exceeding the risk-based screening values were identified as COPCs, while constituents with concentrations below the risk-based screening values were excluded from further analysis. Those chemicals without a risk-based screening value, and for which no surrogate chemical could be identified, were included in the uncertainty evaluation. Importantly, background and ambient conditions were not considered during the screening process; therefore, the COPCs identified during the screen may include constituents that are not consistent with industrial sources or those that are typical of background conditions.

For sediment samples, the risk-based screening values are based on the USEPA Regional Screening Levels (RSLs) for residential soils as of November 2018 (USEPA 2018d). These risk-based values are derived to correspond to either a 1×10^{-6} cancer risk or a noncarcinogenic hazard quotient (HQ) of 0.1 to account for potential cumulative effects. They were developed using default, conservative exposure assumptions for an integrated adult/child receptor (for cancer-based values) or a child receptor (noncancer-based values) assuming exposure through ingestion, dermal contact, and/or inhalation of vapors and fugitive dust from soil. Because no screening values are available for sediment, the soil screening values serve as conservative criteria, because it is likely that the potential receptors will spend less time offshore in the intertidal areas of Newark Bay as compared to onshore recreational/residential areas. The screening values used for chemicals in sediment are included in Table B-1 of Appendix B.

For surface water samples, risk-based screening values used for comparison to maximum concentrations are based on the lowest value from the USEPA RSLs for tap water as of November 2018 (USEPA 2018d), USEPA maximum contaminant levels (MCLs) (as provided in USEPA 2018d), or New Jersey Department of Environmental Protection (NJDEP) surface water screening levels (N.J.A.C 7:9B Surface Water Quality Standards). Similar to the residential soil RSLs described above, the tap water RSLs correspond to either a 1×10^{-6} cancer risk or a noncarcinogenic HQ of 0.1 (to account for potential cumulative effects), assuming exposure through ingestion, dermal contact, and/or inhalation of contaminants in tap water. They were developed using default, conservative exposure assumptions for an integrated child/adult receptor (for cancer-based values) or a child receptor (for noncancer-based values). The tap water RSLs are conservative criteria for surface water, because potential receptors would be exposed via incidental ingestion and less frequent dermal contact, as compared to residential use of tap water. The screening values for chemicals in surface water are included in Table B-1 of Appendix B.

The USEPA does not publish RSLs for fish or crab tissue; however, risk-based screening values can be calculated using USEPA’s RSL calculator. These values were derived assuming fish or crab ingestion by an adult, assuming an ingestion rate of 54 g/day (USEPA 1991b), for cancer-based screening levels and a child ingestion rate of 18 g/day for the noncancer-based screening levels. This latter value reflects a modification to the adult ingestion rate based on body-weight differences between adults and children. As with sediment and surface water, the screening values for noncarcinogenic effects were decreased by a factor of 10 for the purpose of this toxicity screen (HQ of 0.1). The screening values for chemicals in fish and/or crab are included in Table B-1 of Appendix B.

A residential soil RSL of 400 mg/kg is available for lead from USEPA (USEPA 2018d). This value is derived based on a pharmacokinetic model designed to predict the probable blood lead concentrations for children between 6 months and 7 years of age who have been exposed to lead through various sources (air, water, soil, dust, diet, and in utero contributions from the mother). A tap water RSL of 15 µg/L is also available for lead; however, this value is not health-based, but is equal to USEPA’s action level for lead in drinking water (USEPA 2018d). Finally, to screen for lead in fish or crab tissue, the Food and Drug Administration (FDA) action level for lead in crustacea of 1.5 mg/kg was used (FDA 2007).

3.4 COPC Selection

The results of the COPC selection process are presented in Tables 3-8 through 3-11 for accessible surface sediment, surface water, and fish/crab tissue, respectively (RAGS Part D Tables 2.1 to 2.4). A “Y” in the second-to-last column indicates that a chemical was retained as a COPC; an “N” indicates that a chemical was not retained as a COPC; and “UNC” indicates that the chemical will be discussed in the uncertainty evaluation. The basis for this determination is provided in the last column.

Several known human carcinogens, as defined by NTP (2016), were detected in one or more media, and were retained as COPCs in those media:

- PCDD/Fs
- Dioxin-like (DL) PCBs
- Arsenic
- Hexavalent chromium [Cr(VI)]
- Trivalent chromium [Cr(III)], based on use of Cr(VI) as a surrogate
- Trichloroethylene.

Three other known human carcinogens (i.e., benzene, benzidine, and vinyl chloride) were not detected in any sample and are discussed further in the uncertainty evaluation.

Several chemicals detected in sediment, surface water, and/or biota samples were not identified as COPCs based on low frequency of detection (detected in fewer than 5% of the samples) and the maximum concentration (detect or non-detect) below the screening value. In surface water, five chemicals detected in fewer than 5% of the samples had a maximum concentration (detect or non-detect) greater than the screening level (1,2,4-trichlorobenzene, 1,4-dichlorobenzene, 2,4-dinitrotoluene, bis(2-ethylehexyl)phthalate, and cyanide); therefore, these chemicals are discussed in the uncertainty section. Similarly, one chemical in fish tissue (antimony) and five chemicals in crab tissue (1,2-diphenylhydrazine, 3,3’-dichlorobenzidine, antimony, benzaldehyde, and benzo(j,k)fluoranthene) were detected in fewer than 5% of the samples but had maximum concentrations (detect or non-detect) greater than their respective screening values. These chemicals are also discussed in the uncertainty evaluation.

3.4.1 Summary of COPCs

A number of chemicals/chemical groups were identified as COPCs in one or more media, as summarized below and in Table 3-13:

- Accessible surface sediment: 56 chemicals/chemical groups
- Surface water: 61 chemicals/chemical groups
- Fish tissue: 43 to 52 chemicals/chemical groups, depending on species (American eel, bluefish, striped bass, summer flounder, white perch)
- Crab tissue: 55 to 67 chemicals/chemical groups, depending on tissue type (muscle, hepatopancreas).

It is important to note that, for consistency, if a chemical was identified as a COPC in any fish or crab tissue, it was retained as a COPC for all tissue types. Therefore, the COPC lists used in the BHHRA are identical for all types of biota and include a total of 71 chemicals/chemical groups. In total, 84 chemicals/chemical groups were identified as COPCs.

Finally, a total of 13 chemicals were identified as COPCs in biota, but not in sediment or surface water, as shown in Table 3-12. These chemicals were generally detected at low concentrations (less than 1 mg/kg in sediment and less than 1 µg/L in surface water). For some chemicals (e.g., pesticides, methyl mercury), their presence in biota may reflect bioaccumulation.

4. Exposure Assessment

The purpose of the exposure assessment is to estimate the magnitude of current and reasonably anticipated future human exposure to COPCs associated with the NBSA. A detailed Conceptual Site Model (CSM) has been developed (GSH 2019) that describes the current understanding of the NBSA and inter-relationships between sources, fate and transport, contaminated media, and receptors at the NBSA. This overall NBSA CSM is used below as the basis for a Human Health Conceptual Site Model (HHCSM) that identifies the sources, media, and exposure pathways by which humans are potentially exposed to COPCs. The exposure assessment calculates the frequency, duration, and magnitude of exposures associated with complete pathways in the HHCSM. Exposures are affected by concentrations of COPCs in exposure media, as well as characteristics of the exposure location, and activities and behaviors of potentially exposed individuals.

A combination of site-specific data representing the conditions and local population in the NBSA and USEPA default input values are used in the calculations to estimate exposures. The outcome of the exposure assessment is exposure-point concentrations and subsequent human receptor intakes of COPCs for all complete exposure pathways associated with current and reasonably anticipated future human exposures at the NBSA. Consistent with USEPA guidance (USEPA 1992a), two exposure scenarios are evaluated that represent reasonable maximum exposure (RME) and central tendency exposure (CTE).

This section is organized as follows:

- Section 4.1 discusses the HHCSM for the NBSA, including the potentially affected media, and the pathways by which people may be exposed to site media (potential exposure scenarios).
- Section 4.2 presents the methods used to quantify potential exposures for each potential exposure scenario.
- Section 4.3 identifies the exposure parameters and values used to quantify potential exposures.
- Section 4.4 describes the approaches used to estimate exposure-point concentrations (EPCs) for each medium.

4.1 Human Health Conceptual Site Model

Figure 4-1 presents the HHCSM, which identifies the sources, media, and exposure pathways by which humans are potentially exposed to COPCs at the NBSA. A complete exposure pathway generally consists of four elements:

1. Source and mechanism of chemical release
2. Retention or transport medium
3. Point of potential contact with the contaminated medium (i.e., exposure point)
4. Exposure route (e.g., ingestion).

For risks to human receptors to be present, all of these elements must exist; otherwise, the pathway is deemed incomplete (USEPA 1989). Therefore, human exposure pathways at the NBSA are identified based on consideration of the sources, releases, types, and locations of chemicals at the site; the likely environmental fate (including persistence, partitioning, transport, and intermedia transfer) of these chemicals; and the location and activities of the potentially exposed populations. The receptors and exposure scenarios associated with future use are not expected to differ significantly from those being evaluated under the current use.

Primary sources of contamination include industrial point sources, non-point-source runoff, POTW overflows, CSOs, tributaries, and atmospheric deposition. Secondary contamination sources include sediment and surface water.

As shown in Figure 4-1, the media relevant to evaluating potential human health exposures for the NBSA are:

- Sediment and surface water
- Fish tissue
- Shellfish tissue[2]
- Ambient air
- Waterfowl, turtles, and other species in the NBSA.

Human use activities in the NBSA are limited based on the shoreline type (e.g., bulkhead, bridges, sheet). Table 4-1 (RAGS Part D Table 1) presents the selection of potentially exposed human populations and exposure pathways and provides the rationale for inclusion of each pathway using either quantitative or qualitative methods.

The human receptors that have the greatest potential to be exposed to COPCs at the NBSA include a recreational user (e.g., boater, swimmer, wader) and an angler/sportsman. The complete set of potentially exposed populations in the NBSA includes the angler/sportsman, recreational user (boater, swimmer, wader), resident, transient, and port/dock worker. Potential exposure routes include ingestion of fish and shellfish, dermal contact with surface water and sediment, incidental ingestion of surface water and sediment, and inhalation of vapors (via ambient air).

As was found in previous risk assessments for the Hudson and Housatonic Rivers (USEPA and USACE 2000, USACE and USEPA 2005), the most significant pathway by which people may be exposed to chemicals in the NBSA is expected to be from consuming contaminated fish and/or shellfish. Following discharge, chemicals can partition by becoming attached to sediment, or they can remain suspended (or dissolved) in the water column. Chemicals enter the human food chain via bioaccumulation in tissues of fish and shellfish exposed directly to chemicals in the water column, in sediments, and/or in the tissues of prey.

In Appendix C-1, a screening assessment for the inhalation of volatile and semivolatile organic COPCs from exposed NBSA sediments was conducted to determine whether this route of exposure should be included in the BHHRA. Consistent with the BHHRA for the Lower Passaic River Study Area (LPRSA) (AECOM 2017),

[2] While multiple shellfish may be present in Newark Bay, ingestion of shellfish is based solely on data for blue crab.

inhalation screening levels for Newark Bay were developed using USEPA's *Soil Screening Guidance: User's Guide* (USEPA 1996a). These screening levels were then compared to upper-bound Newark Bay sediment concentrations to determine whether potentially elevated carcinogenic risk and noncarcinogenic hazards are present. Based on these results, the sediment volatilization pathway was excluded from the final cumulative risk estimates in the BHHRA.

Similarly, in Appendix C-2, the potential for exposure to volatile or semivolatile organic COPCs in surface water via inhalation of vapors in ambient air was evaluated in a manner consistent with the baseline human health risk assessment for the LPRSA (AECOM 2017). Specifically, volatilization of COPCs from surface water was evaluated using a tiered approach. The first tier was based on a very conservative model for estimating evaporation from surface water and dispersion into a simple box model. The resulting ambient air concentrations were compared to USEPA RSLs for air, assuming a residential scenario. For those chemicals for which the Tier 1 air concentration exceeded the residential air RSL, the second tier was based on a more realistic model for estimating evaporation from surface water and screening-level air dispersion modeling. As shown in the appendix, the estimated annual average air concentrations for all ten COPCs were below their respective residential air RSLs, by at least an order of magnitude. Accordingly, the surface water volatilization pathway was not included in the final cumulative risk estimates in the BHHRA.

Exposures by ingestion of waterfowl or species other than fish and shellfish are not included in the quantitative risk assessment calculations. The New Jersey Division of Fish and Wildlife, Bureau of Law Enforcement has not observed anyone hunting in the NBSA (USEPA 2017a). In addition, the type of waterfowl observed in the NBSA consume grass, not fish, which would result in lower tissue concentrations. For these reasons, ingestion of waterfowl and animals other than fish/crabs is likely to be minimal. This topic is discussed further in the uncertainty section.

Residential receptors are not included as an exposed population in the quantitative risk assessment calculations. As described in the Problem Formulation (Tierra 2013), the Newark Bay shoreline does not appear to support residential land use, because, although there are residences near the Bay, access to the Bay from the residential properties is limited by physical barriers such as steep slopes and rocks. Limited residential areas were observed along the eastern shore of the Bay; these areas have either manmade or natural barriers to impede human access to the Bay. Surface water from the Bay is not used as a domestic water supply. Residents may contact surface water during activities near their homes, but this contact is expected to be minor. Potential risks to residential receptors relative to other receptors are discussed in the uncertainty section.

Transient persons are not included as an exposed population in the quantitative risk assessment calculations. Although transients have been observed in temporary makeshift shelters near the Passaic River (Proctor et al. 2002), information sources reviewed do not indicate that a significant transient population inhabits the NBSA shoreline. As discussed in the Problem Formulation (Tierra 2013), internet searches, peer-reviewed literature, public studies, and long-term community plans were reviewed to assess the potential presence of transient populations. While there are occasional descriptions of transient individuals in the area, the information sources reviewed do not indicate that a significant transient population inhabits the NBSA shoreline. Given this evidence, the transient population is evaluated qualitatively in the BHHRA, and is discussed in the uncertainty section.

Potentially exposed human receptor populations and pathways at the NBSA that are included in the quantitative analysis of the BHHRA include those listed below.

Receptor	Medium	Pathway
Current/Future Angler/Sportsman Adult Adolescent Child (fish/crab tissue only)	Intertidal/Subtidal Surface Sediment	Incidental ingestion
		Dermal contact
	Surface Water	Incidental ingestion
		Dermal contact
	Fish/Crab Tissue	Fish/crab ingestion
Current/future Swimmer Adult Adolescent Child	Intertidal/Subtidal Surface Sediment	Incidental ingestion
		Dermal contact
	Surface Water	Incidental ingestion
		Dermal contact
Current/future Wader Adult Adolescent Child	Intertidal/Subtidal Surface Sediment	Incidental ingestion
		Dermal contact
	Surface Water	Incidental ingestion
		Dermal contact
Current/future Boater Adult Adolescent	Intertidal/Subtidal Surface Sediment	Incidental ingestion
		Dermal contact
	Surface Water	Incidental ingestion
		Dermal contact
Current/future Worker Adult	Intertidal/Subtidal Surface Sediment	Incidental ingestion
		Dermal contact

Note: child is 1 to <7 years; adolescent is 7 to <19 years; adult is >18 years

4.2 Quantification of Potential Exposures

In this section, equations used to quantify potential COPC chronic daily intakes, and the exposure assumptions and parameters of the equations, are presented and discussed. Exposure assumptions are based on current and future land use, which is described in Section 2.2. Exposure assumptions and parameters are consistent with site conditions and use standard USEPA risk assessment approaches.

The calculated COPC chronic daily intake is expressed in units of milligram COPC per kilogram body weight per day (mg/kg-day). For COPCs that are noncarcinogenic, the chronic daily intake is averaged over the exposure duration (ED). For COPCs that are carcinogenic, the chronic daily intake is averaged over the assumed receptor's lifetime (70 years).

4.2.1 Estimating Potential Exposure to COPCs in Sediment

Multiple receptors may be exposed to COPCs in sediment via incidental ingestion and dermal contact. As noted previously, the potential exposure to volatile COPCs in sediment via inhalation is not of concern (see Appendix C-1). The following equations were used to estimate potential exposure to COPCs in sediment (USEPA 1989; 2004b; 2018d).

Intake (lifetime and chronic) following incidental ingestion of sediment (mg/kg-day):

$$Intake = \frac{C_s \times IR_{sed} \times FI \times EF \times ED \times RBA \times CF}{BW \times AT}$$

Where:

Intake	=	intake (mg/kg-day)
C_s	=	exposure-point concentration – sediment (mg/kg sediment)
IR_{sed}	=	ingestion rate of sediment (mg sediment/day)
FI	=	fraction from source (unitless)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
RBA	=	relative bioavailability factor (chemical-specific) (unitless)
CF	=	conversion factor (kg sediment/10^6 mg sediment)
BW	=	body weight (BW)
AT	=	averaging time (days)

Intake (lifetime and chronic) following dermal contact with sediment (mg/kg-day):

$$Intake = \frac{C_s \times SA \times AF \times EF \times ED \times ABSd \times FI \times CF}{BW \times AT}$$

Where:

Intake	=	intake (mg/kg-day)
C_s	=	exposure-point concentration – sediment (mg/kg sediment)
SA	=	skin surface area (cm^2/day)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)

ED = exposure duration (year)

ABSd = dermal absorption factor (chemical-specific) (unitless)

FI = fraction from source (unitless)

CF = conversion factor (kg sediment/10^6 mg sediment)

BW = body weight (BW)

AT = averaging time (days)

4.2.2 Estimating Potential Exposure to COPCs in Surface Water

Multiple receptors may be exposed to COPCs in surface water via incidental ingestion and dermal contact. As noted previously, the potential exposure to volatile COPCs in surface water via inhalation is not of concern (see Appendix C-2). The following equations were used to estimate potential exposure to COPCs in surface water (USEPA 1989; 2004b).

Intake (lifetime and chronic) following incidental ingestion of surface water (mg/kg-day):

$$Intake = \frac{C_{wat} \times IR_{wat} \times FI \times EF \times ED}{BW \times AT \times CF}$$

Where:

Intake = intake (mg/kg-day)

C_{wat} = exposure point concentration – surface water (µg/L water)

IR_{wat} = ingestion rate of surface water (L water/hour)

FI = fraction from source (unitless)

ET = exposure time (hours/day)

EF = exposure frequency (days/year)

ED = exposure duration (year)

RBA = relative bioavailability factor (chemical-specific) (unitless)

CF = conversion factor (10^3 µg chemical/mg chemical)

BW = body weight (kg)

AT = averaging time (days)

EPA (2004b) guidance for calculating dose from dermal exposure to surface water differentiates between organic and inorganic chemicals. Dermally absorbed dose (lifetime and chronic) following dermal exposure to surface water (mg/kg-day):

Inorganics

$$DAD = \frac{DA_{event} \times SA \times EV \times EF \times ED}{BW \times AT}$$

Where:

DAD = dermally exposed dose (mg/kg-day)

DA_{event} = absorbed dose per event (mg/cm^2-event)

SA = skin surface area (cm^2)

EV = event frequency (event/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kg)

AT = averaging time (days)

The dose absorbed per unit area per event (DAevent) is calculated as follows for inorganics or highly ionized organics:

$$DA_{event} = C_{wat} \times K_p \times ET \times CF_1 \times CF_2$$

Where:

DA_{event} = absorbed dose per event (mg/cm^2-event)

C_{wat} = exposure point concentration – surface water (µg/L water)

K_p = permeability constant (cm/hr) (chemical-specific)

ET = exposure time (hours/event)

CF_1 = conversion factor (L/1000 cm^3)

CF_2 = conversion factor (mg/1000 µg)

The DA_{event} for organics is calculated as follows:

If ET ≤ t*

$$DA_{event} = 2\,FA \times Kp \times C_{wat} \times CF\sqrt{\frac{6\,tau_{event} \times ET}{\pi}}$$

If ET > t*

$$DA_{event} = FA \times K_p \times C_{wat} \times CF\left[\frac{ET}{1+B} + 2\,tau_{event}\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

Where:

DA_{event} = absorbed dose per event (mg/cm^2-event)

FA = faction absorbed water

Kp = dermal permeability constant (cm/hour) (chemical-specific)

C_{wat} = exposure-point concentration – surface water (µg/L water)

tau_{event} = lag time per event (hour/event) (chemical-specific)

ET = exposure time (hours/event)

t* = time to steady state (hour); 2.4 ×tau_{event}

CF = conversion factor (L/1000 cm^3)

4.2.3 Estimating Potential Exposure to COPCs in Fish/Shellfish Tissue

The angler/sportsman may be exposed to COPCs in fish or shellfish tissue via ingestion. The following equation was used to estimate potential exposure to COPCs in fish tissue (USEPA 1989).

Intake (lifetime and chronic) following fish/shellfish ingestion:

$$Intake = \frac{C_t \times IR \times (1 - Loss) \times FI \times EF \times ED \times CF}{BW \times AT}$$

Where:

Intake = intake (mg/kg-day)

C_t = exposure-point concentration – tissue (mg/kg tissue)

IR_{sed} = ingestion rate of fish/shellfish (g tissue/day)

FI = fraction from source (unitless)

EF = exposure frequency (days/year)

ED = exposure duration (year)

CF = conversion factor (kg tissue/10^3 g tissue)

BW = body weight (BW)

AT = averaging time (days)

4.3 Receptor- and Chemical-Specific Exposure Parameters

This section presents the receptor- and chemical-specific exposure parameters that are inputs to the equations presented in Section 4.2 to quantify potential intake of COPCs by each exposure pathway and human receptor population identified for the NBSA. Consistent with USEPA guidance (USEPA 1992a), two exposure scenarios are evaluated in the BHHRA that represent reasonable maximum exposure (RME) and central tendency exposure (CTE). In risk calculations, the difference between these two scenarios is reflected in different exposure parameter values. The intent of the RME is to estimate a conservative exposure case that is above the average case but still within the range of possible exposures (USEPA 1989, 1992a). The CTE uses average exposure parameters to calculate the average exposure of an individual.

The values used for each of the RME and CTE exposure parameters are presented in Tables 4-2 to 4-11 (RAGS Part D Tables 4.1 to 4.10); chemical-specific parameters are presented in Tables 4-12 and 4-13. The exposure parameter values are intended to represent both current and reasonably anticipated future conditions at the NBSA. The receptors and exposure scenarios associated with future use are not expected to differ significantly from those being evaluated under current use.

A description of each receptor evaluated quantitatively in the BHHRA is provided below, followed by discussions of receptor- and chemical-specific exposure parameters.

4.3.1 Angler/Sportsman Definition

The angler/sportsman is defined as an adult or adolescent catching and consuming a variety of fish (i.e., American eel, bluefish, striped bass, summer flounder, and white perch) or shellfish (i.e., blue crab) from the banks of the NBSA or a boat on the NBSA for recreational purposes. In spite of the “eat none” fish/crab consumption advisories (NJDEP and NJDOH 2018), the collection and consumption of fish and shellfish from the NBSA has been documented (Burger et al. 1999; Burger 2002; NJDEP 2002; Pflugh et al. 1999). Also, any fishing or crabbing that occurs along the shore could result in direct contact with both surface water and sediment. Therefore, for the angler/sportsman, the pathways quantitatively evaluated include fish and crab ingestion, dermal contact with sediment and surface water, and incidental ingestion of sediment and surface water. Inhalation may occur if activities occur in areas where volatiles are present in sediment or surface water; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible (see Appendices C-1 and C-2).

Anglers are assumed to share self-caught fish and/or crab with family members (i.e., children 1 to <7 years of age). Young children are expected to rarely accompany the family member who is fishing. Exposures would be much less than those experienced by children who visit the Bay to wade or swim. Therefore, the exposure of a child to sediment and surface water is not evaluated under the angling scenario.

An evaluation of subsistence fishing is not included in the BHHRA, because there is no evidence of individuals who rely solely on their daily catch to subsist.

4.3.2 Swimmer Definition

Recreational use associated with the NBSA includes boating, wading, and swimming, as well as walking or playing along the shore on exposed sediment. Thus, exposure to sediment and surface water is expected. Swimming does occur in Newark Bay. However, the exposure frequency and duration for swimming are reasonably assumed to be relatively low, both currently and in the future, due to the deterrents to swimming in the Bay. These include the presence of trash and debris, pathogenic contamination, and ship traffic. Swimmers may experience incidental ingestion of surface water and may contact sediment while entering and leaving the Bay from the banks of the water. Inhalation may occur if activities are in areas where volatiles are present in sediment or surface water; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible (see Appendices C-1 and C-2).

4.3.3 Wader Definition

Families visiting parks along the banks or wading down by the Bay to bird watch may contact surface water and sediment along the banks. Inhalation may occur if activities are in mudflat areas and volatiles are present in sediment or surface water; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible (see Appendices C-1 and C-2).

4.3.4 Boater Definition

The potential exists for recreational boating, including kayaking, to occur in the Bay. It is assumed that the boater's potential for exposure to Bay sediment is greatest while boating in small crafts such as sculls, kayaks, or canoes. Docks are typically used, and boaters are expected to remain in their boats, but boaters may occasionally contact sediment when wading is necessary. Young children (<7 years old) are not expected to participate in boating activities on the Bay; any such exposure would be rare and much less than that experienced by young children visiting the Bay specifically to wade or swim. Therefore, a young child boater scenario is not evaluated. Inhalation may occur if activities are in areas where volatiles are present in sediment or surface water; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible (see Appendices C-1 and C-2).

4.3.5 Worker Definition

Workers may be assigned to collect shoreline trash or perform other work that leads to contact with sediment along the Bay. It is assumed that workers are adults (>18 years of age). Contact with surface water is not typically expected to occur. Inhalation may occur if activities are in mudflat areas and volatiles are present in sediment; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible (see Appendix C-1).

4.3.6 Fish and Crab Consumption Exposure Parameters

As explained in Section 4.1, the most significant pathway by which people may be exposed to chemicals in the NBSA is expected to be from consuming contaminated fish and/or shellfish (crab). The following subsections discuss exposure parameters used to calculate COPC intakes by the fish and crab consumption pathways. These parameters include fish and crab ingestion rates, fractions of fish and crab consumed that are from the NBSA, and the amount of chemical lost during the cooking process.

4.3.6.1 Fish Ingestion Rate

Fish and crab ingestion rates used in the BHHRA were developed as part of the LPRSA BHHRA (USEPA 2012a, 2012b). The ingestion rate assumes that the fish are caught only from the NBSA. It is assumed that ingestion of fish from local sources will be the main source of fish consumption for the angler/sportsman. For consumption of fish, the analysis of ingestion rates was based on data for anglers/sportsmen from the following sources:

- Exposure Factors Handbook (USEPA 2011)
- Two surveys conducted for the Newark Bay Complex (Burger 2002, May and Burger 1996)
- A survey conducted for Barnegat Bay, an estuary on the New Jersey shore (Burger et al. 1998)
- The New Jersey Household Fish Consumption Survey (CPIP and NJMSC 1993)
- A statewide angler survey conducted in New York (Connelly et al. 1992).

Based on USEPA's evaluation of these studies, estimates of adult fish ingestion rates were derived for both the RME and CTE adult angler/sportsman using the 90th and 50th percentile ingestion rates, respectively, from the Burger (2002) and Connelly et al. (1992) data. The adult fish ingestion rates derived (USEPA 2012b) and used in the NBSA BHHRA are:

- RME adult angler/sportsman = 34.6 g/day; this rate is the average of the 90th percentile value of the two studies
- CTE adult angler/sportsman = 3.9 g/day; this rate is the average of the 50th percentile value of the two studies.

Fish ingestion rates for the adolescent and child angler/sportsman were based on the assumption that the intake for the adolescent will be approximately two-thirds that of the adult, and the intake for the child will be approximately one-third that of the adult (USEPA 2011). Therefore, the adolescent and child fish ingestion rates used in the BHHRA are as follows:

- RME adolescent angler = 23.1 g/day
- CTE adolescent angler = 2.6 g/day
- RME child = 11.5 g/day
- CTE child = 1.3 g/day.

The uncertainty associated with the fish consumption rates is discussed in Section 7.

4.3.6.2 Crab Ingestion Rate

As explained above, fish and crab ingestion rates used in the BHHRA were developed as part of the LPRSA BHHRA (USEPA 2012a, 2012b). USEPA Region 2 evaluated the data collected for the Burger (2002) study in the Newark Bay Complex of New Jersey to estimate crab consumption. The Burger study reported a 50th percentile ingestion rate of 3.0 g/day and a 90th percentile ingestion rate of 20.9 g/day. As was assumed for fish, crab ingestion rates for the child and adolescent receptors were estimated assuming rates that are one-third and two-thirds of the adult ingestion rates, respectively. The crab ingestion dates used in this BHHRA are:

- RME adult crabber = 21 g/day
- CTE adult crabber = 3 g/day
- RME adolescent crabber = 14 g/day
- CTE adolescent crabber = 2 g/day
- RME child = 7 g/day
- CTE child = 1 g/day.

The uncertainty associated with the crab consumption rates is discussed in Section 7.

4.3.6.3 Fraction Ingested for Fish and Crab

The fraction ingested parameter (FI) represents the fraction of fish and crab consumed by the receptors that are from the NBSA. Although it is possible that anglers/sportsmen catch and consume fish and crab from rivers and other water bodies in the area, the risk assessment conservatively assumes that 100% of the catch is obtained from the NBSA for both the RME and CTE scenarios. The uncertainty associated with the assumption that all of the angler's catch comes from the NBSA is discussed in Section 7.

4.3.6.4 Cooking Loss for Fish and Crab

A cooking loss factor for exposure from fish ingestion accounts for the amount of chemical in fish tissue that is lost during cooking and thus is not consumed by the receptor. A cooking loss of 0% is assumed for the RME scenario for all COPCs, a conservative approach that accounts for the potential scenario wherein individuals habitually consume cooking juices and pan drippings in addition to the cooked fish tissue. The assumption for the CTE fish ingestion scenario is that individuals discard the cooking juices and pan drippings, only consuming the cooked fish tissue. Therefore, chemical-specific cooking loss factors were developed for these scenarios for PCDD/Fs, PCBs, dieldrin, and several pesticides (the DDx isomers DDE, DDD, and DDT; alpha (cis)- and gamma (trans)-chlordane; cis- and trans-heptachlor epoxide; mirex; cis- and trans-nonachlor, and hexachlorobenzene).

The cooking loss values used in the CTE fish consumption scenario represent the 50th percentile of the current empirical cooking loss data sets for combined skin-on/skin-off tissues of various fish species by various cooking methods. The majority of these data are related to PCDD/Fs, PCBs, and organochlorine pesticides, and are summarized in USEPA's 2000 Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories (Volume 2, Appendix C) (USEPA 2000). In 2012, AECOM drafted a technical memorandum to update the cooking loss values recommended in the 2011 USEPA Region 2 Risk Analysis and Risk Characterization (RARC) Plan for the Lower Passaic River Study Area. For this effort, the authors summarized the updated cooking loss literature on fish consumption and cooking loss for PCDD/Fs, PCBs, and DDx chemical groups, calculating cooking loss for each study on a mass balance basis and developing summary statistics for each of these three chemical groups (AECOM, 2012b).[3] Since then, Rawn et al. (2013) published more cooking loss data for PCDD/Fs and PCBs for several fish species for three common cooking methods.

For this BHHRA, cooking loss data sets for PCDD/Fs and PCBs were compiled from both Rawn et al. (2013) and the 2012 Draft AECOM Technical Memorandum. While the authors of the draft technical memorandum suggested that cooking loss data specific to DL-PCBs be included in the PCDD/F cooking loss data set (due

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[3] Note: The 2012 Draft AECOM technical memo on cooking loss in fish was received by ToxStrategies in March/April 2012 for review and comment. ToxStrategies never received the final version that was submitted to USEPA July 5, 2012, although the cooking loss distribution analysis included in the 2017 LPRSA HHRA document (Figure 7-2 of that document) is nearly identical to the analogous figure in the March 27, 2012, draft technical document.

to similar cooking loss magnitude and broader biochemical congruencies), USEPA concluded that the DL-PCB data set was too sparse to justify extending the idea of "dioxin-like" properties to the underlying physicochemical properties that moderate parameters like cooking loss. Therefore, the few DL-PCB cooking loss data points were included in the larger PCBs cooking loss data set.

For pesticides, cooking loss estimates were derived solely from the cooking loss data summarized for each respective chemical or chemical group in the 2000 USEPA Guidance. It should be noted that a cooking loss of 0% for all metals is assumed for both the RME and CTE scenarios per USEPA recommendation. This is because metals distribute in a manner different from that of organochlorine pesticides, tending to concentrate in liver, kidney, and/or muscle tissues, with little evidence of reduction from fillets after cooking (USEPA 2000). A cooking loss of 0% was also assumed for organics (benzaldehyde and pyridine) and PAHs, because the CL data are inadequate for developing values sufficient for risk assessment.

As with fish, the cooking loss factor for crab accounts for the amount of chemical in crab tissue that is lost during the cooking process and thus is not consumed by the receptor. Blue crabs are most often cooked whole by boiling or steaming (Sea Grant Marine Advisory Program 2006). For this reason, exposure to the chemicals in the whole crab, even the uneaten parts, may still occur if the liquid used to boil the crab is used in soups or other prepared dishes. Unlike the cooking loss data set for fish, however, the cooking loss literature for crab tissue is very sparse, with only a single relevant study (Zabik et al. 1992) reporting an approximately 20% reduction of PCBs from the tissue of steamed or boiled blue crabs (the species relevant to NBSA). The study found that about 80% of the PCBs is lost from the crab tissues in the cooking water. However, this data set (single study) is insufficient for use in the BHHRA. Therefore, it is assumed in this BHHRA that the cooking liquid is consumed along with the crabmeat, and thus, the CTE cooking loss factor for crab is assumed to be zero for all chemicals.

The following table summarizes cooking loss factors for fish and crab assumed in the BHHRA.

Chemical of Potential Concern	Cooking Loss — Fish		Cooking Loss — Crab	
	RME	CTE	RME	CTE
Dioxin-like Compounds				
PCDD/Fs	0%	35%	0%	0%
DL PCBs	0%	28%	0%	0%
Non-DL PCBs				
Total Non-DL PCBs	0%	28%	0%	0%
PAHs				
All PAHs	0%	0%	0%	0%
Pesticides & Organics				
2,4'-DDD	0%	31%	0%	0%
2,4'-DDE	0%	32%	0%	0%
2,4'-DDT	0%	23%	0%	0%
4,4'-DDD	0%	31%	0%	0%

Chemical of Potential Concern	Cooking Loss — Fish		Cooking Loss — Crab	
	RME	CTE	RME	CTE
4,4'-DDE	0%	32%	0%	0%
4,4'-DDT	0%	23%	0%	0%
Benzaldehyde	0%	0%	0%	0%
Chlordane, alpha (cis)	0%	37%	0%	0%
Chlordane, gamma (trans)	0%	32%	0%	0%
Dieldrin	0%	30%	0%	0%
Heptachlor epoxide, cis-	0%	37%	0%	0%
Heptachlor epoxide, trans-	0%	37%	0%	0%
Hexachlorobenzene	0%	33%	0%	0%
Mirex	0%	57%	0%	0%
Nonachlor, cis-	0%	34%	0%	0%
Nonachlor, trans-	0%	28%	0%	0%
Oxychlordane	0%	34%	0%	0%
Pyridine	0%	0%	0%	0%
Inorganics				
All inorganics	0%	0%	0%	0%

4.3.7 Sediment and Surface Water Exposure Parameters

As shown in Figure 4-1 and Table 4-1, some activities that occur at the NBSA could result in direct contact with both surface water and sediment. Exposure parameters specific to the assessment of potential exposure to COPCs resulting from direct contact with sediment and surface water include incidental ingestion rates of sediment and surface water, body surface areas in contact with sediment and surface water, sediment-to-skin adherence factors, surface water exposure time, and sediment and surface water exposure frequencies. The following subsections discuss these exposure parameters.

4.3.7.1 Incidental Ingestion of Sediment

Studies on incidental ingestion of soil have been conducted, but similar data for sediment are lacking (USEPA 2011). It is expected that some level of sediment removal will result in less hand-to-mouth loading than is the case with soil ingestion. In the BHHRA, the following assumptions are used:

- RME incidental ingestion of sediment occurs at a rate that is 50% of the recommended USEPA default values of 100 mg/day for adults and 200 mg/day for children. Thus, the BHHRA uses 50 mg/day for adults and adolescents and 100 mg/day for children in the RME scenarios that involve potential contact with sediment.

- For the CTE scenarios, the BHHRA assumes sediment ingestion rates that are 50% of the assumed RME rates; that is, 25 mg/day for adults and adolescents and 50 mg/day for children.

4.3.7.2 Incidental Ingestion of Surface Water

Data for incidental surface water ingestion during activities such as fishing, wading, and boating are generally lacking. USEPA has developed recommended default values for incidental ingestion of water during swimming (USEPA 2011). For the BHHRA it is assumed that incidental ingestion of surface water by the child and adolescent receptor during swimming occurs at the USEPA-derived mean rate for children (6–15 years old) of 0.05 L/hr. It is assumed that the adult rate during swimming is the USEPA mean rate of 0.021 L/hr for adults. These rates are used for both the RME and CTE swimmer scenarios. The incidental surface water ingestion rate for anglers/sportsmen, waders, and boaters is assumed to be half of what occurs during swimming, or 0.025 L/hr for children and adolescents and 0.011 L/hr for adults, for both the RME and CTE scenarios.

4.3.7.3 Skin Surface Areas in Contact with Sediment and Surface Water

The skin (dermal) surface area exposed to surface water and sediment is dependent on type of activity and receptor. Different activities are assumed to result in exposure of different body parts. Different receptors (adult, adolescent, or child) have different surface areas corresponding to body parts. The table below summarizes the assumptions for exposed skin surface area used in the BHHRA. The average of the mean values for male and female skin surface areas reported by USEPA (USEPA 2011, 2014) are used. The same skin surface areas are used for the RME and CTE scenarios in the BHHRA. The BHHRA makes the following assumptions about exposed skin:

- Anglers/sportsman and waders are assumed to wear short-sleeved shirts and shorts (no shoes); therefore, the exposed skin surface is limited to the head (face), hands, forearms, lower legs, and feet.
- Adult boaters are assumed to wear shoes, and their exposure to surface water (due to splashing) is assumed to be limited to the hands, forearms, and face. Adolescent boaters are assumed to wear shorts or bathing suits and no shoes, so their exposure to surface water includes the lower legs and feet, as well as the hands, forearms, and face.
- During swimming by all age groups, the entire skin surface area is used for contact with surface water. Swimmers' dermal contact with sediment as they enter and leave the Bay is not likely to involve the entire body but would be similar to the exposure of a wader. Therefore, the exposed skin surface for sediment is assumed to be limited to the head, hands, forearms, lower legs, and feet.
- Workers are assumed to wear short-sleeved shirts, long pants, and shoes; therefore, for dermal contact with sediment, their exposed skin surface is limited to the head, hands, and forearms.

Receptor Population	Age Group[a]	Skin Surface Area Contacting Sediment (cm²)		Skin Surface Area Contacting Surface Water (cm²)		Body Parts
		RME	CTE	RME	CTE	
Angler/ Sportsman	Adult	6,492	6,492	6,492	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)
	Adolescent	4,436	4,436	4,436	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)
Boater	Adult	2,692	2,692	2,692	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)
	Adolescent	4,436	4,436	4,436	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)
Swimmer	Adult	6,492	6,492	20,900	20,900	Sediment - Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011) Surface water - Resident default whole body (USEPA 2014)
	Adolescent	4,436	4,436	14,825	14,825	Sediment - Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011) Surface water - Mean value for 7 to <19 years: whole body (USEPA 2011)
	Child	2,272	2,272	7,500	7,500	Sediment - Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011) Surface water - Mean value for 1 to <7 years: whole body (USEPA 2011)
Wader	Adult	6,492	6,492	6,492	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)
	Adolescent	4,436	4,436	4,436	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)
	Child	2,272	2,272	2,272	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)
Worker	Adult	3,527	3,527	na	na	Mean default value for workers: head, hands, forearms (USEPA 2014)

[a] Age groups: adult – > 18 yrs; adolescent – 7 to <19 yrs, young child – 1 to <7 yrs na — not assessed

4.3.7.4 Sediment-to-Skin Adherence Factors

The adherence factor of 0.3 mg/cm^2 for adults is based on the geometric mean of the reed gatherer population from Exhibit 3-3 of RAGS Part E (USEPA 2004b) and is a weighted adherence factor based on hands, lower legs, forearms, and feet. The adherence factor based on reed gathering is a reasonable assumption for evaluating dermal exposure to NBSA sediment during recreational and worker activities. These activities all involve exposure of similar body parts, and reed gathering actions are reasonably comparable to those involved in the recreational and worker activities at the NBSA. The sediment-to-skin adherence factor for children and adolescent receptors is 0.2 mg/cm^2 based on the 50th percentile surface-area-weighted soil adherence data for a child playing in wet soil (USEPA 2004b). These adherence values are applied to both the RME and CTE scenarios.

4.3.7.5 Surface Water Exposure Time

The exposure time, frequency, and duration of exposure to surface water at the NBSA are reasonably assumed to be relatively low, both currently and in the future, due to the deterrents to recreational use of the Bay. These deterrents include the presence of trash and debris, pathogenic contamination, ship traffic, and the general urban and industrial setting of the NBSA. They also limit the number of people who use the Bay in such a way as to be exposed to surface water. The angler/sportsman and wader exposure times used in the BHHRA are based on best professional judgment; CTE exposure times are assumed to be one-half of the RME exposure time. The swimmer exposure time is the national average for swimming, as reported in USEPA (1989), for both the RME and CTE scenarios. The RME exposure time to surface water for boaters is also based on professional judgment. CTE exposure time to surface water for boaters is assumed to be three-quarters of the RME exposure time. The following table summarizes the surface water exposure time assumptions used in the BHHRA.

Receptor Population	**Age Group[a]**	**Surface Water Exposure Time (hours/day)**	
		RME	**CTE**
Angler/Sportsman	adult	1	0.5
	adolescent	1	0.5
Swimmer	adult	2.6	2.6
	adolescent	2.6	2.6
	child	2.6	2.6
Wader	adult	1	0.5
	adolescent	1	0.5
	child	1	0.5
Boater	adult	2	1.5
	adolescent	2	1.5
Worker	adult	na	na

[a] Age groups: adult – > 18 yrs; adolescent – 7 to <19 yrs, young child – 1 to <7 yrs   na — not assessed

4.3.7.6 Sediment and Surface Water Exposure Frequencies

Sediment and surface water exposure frequencies are based on site-specific conditions at the NBSA, including weather (i.e., cold months and frozen conditions limit exposure), type of recreational activity, and worker schedules. The exposure frequencies assumed in the BHHRA are summarized in the table below. These frequencies are not expected to increase in the future. The bases for these assumptions are as follows.

Receptor Population	Age Group[a]	Sediment Exposure Frequency (days/year)		Surface Water Exposure Frequency (days/year)	
		RME	CTE	RME	CTE
Angler/Sportsman	Adult	48 (fishing) 30 (crabbing)	24 (fishing) 15 (crabbing)	48 (fishing) 30 (crabbing)	24 (fishing) 15 (crabbing)
	Adolescent	48 (fishing) 30 (crabbing)	24 (fishing) 15 (crabbing)	48 (fishing) 30 (crabbing)	24 (fishing) 15 (crabbing)
Swimmer	Adult	13	7	13	7
	Adolescent	39	20	39	20
	Child	13	7	13	7
Wader	Adult	13	7	13	7
	Adolescent	39	20	39	20
	Child	13	7	13	7
Boater	Adult	9	4	259	111
	Adolescent	39	20	98	70
Worker	Adult	50	30	na	na

[a] Age groups: adult – > 18 yrs; adolescent – 7 to <19 yrs, young child – 1 to <7 yrs
na – not accessed

Angler/Sportsman

For the RME scenario, adult and adolescent anglers are assumed to be exposed to sediment and surface water twice per week for 5.5 months per year of fishing (48 days/year) and twice per week for 3.5 months per year (30 days/year) of crabbing (Burger 2002). The CTE scenario for anglers assumes exposure frequencies that are one-half of the RME frequencies. Anglers are expected to contact surface water and sediment every day that they fish.

Wader and Swimmer

Adult and child receptors involved in wading and swimming in the Bay are assumed to be exposed to sediment and surface water one day per week for 3 months per year (June, July, and August) under the RME scenario (13 days/year). For the CTE scenario, one half of the RME exposure frequency is assumed (7 days/year). For wading and swimming, adolescents are assumed to have an RME sediment and surface water exposure frequency of 3 days per week for 3 months per year (39 days per year). Again, for the adolescent CTE scenario, one half of the RME exposure frequency is assumed (20 days/year).

Boater

For the boating scenario, the adult RME exposure frequency for surface water is assumed to be 7 days per week for 37 weeks per year (259 days/year). Adult boaters are assumed to have a CTE exposure frequency to surface water of 3 days per week for 37 weeks per year (111 days/year). For sediment, the adult boater RME exposure frequency is assumed to be one day per month for 8.5 months per year (9 days/year). The adult CTE exposure frequency to sediment during boating is assumed to be one-half of the RME value (4 days/year).

Adolescents are assumed to be exposed to surface water during boating for 7 days per week for 14 weeks per year (98 days/year) under the RME scenario and 5 days per week for 14 weeks per year (70 days/year) under the CTE scenario. Adolescents are assumed to have an RME sediment exposure frequency during boating of 3 days per week for 3 months per year (39 days per year). For the adolescent CTE boating scenario, one half of the RME exposure frequency is assumed (20 days/year).

Worker

The adult worker is assumed to be exposed to sediment 1 day per week for 50 weeks per year (50 days per year) for the RME scenario and 1 day per week for 25 weeks per year (25 days) for the CTE scenario.

4.3.8 Exposure Durations

The exposure duration (ED) is the estimate of the total time (in years) that a receptor engages in a particular activity that could result in exposure. The ED assumptions for each of the four receptor populations (adult, adolescent, child, and worker) reflect differences in age span or type of activity (recreation vs. working). The same EDs are used for all recreational activities (angling, wading, swimming, boating) for a given receptor population.

Recreators (Angler/Sportsman, Swimmer, Wader, Boater)

The adult recreator (fishing, wading, swimming, and boating) is assumed to have an RME ED of 20 years (USEPA 2014). This is based on assuming a 26-year upper-bound residential tenure at a single location, minus 6 years as a non-adult (USEPA 2014). The CTE ED for the adult recreator is 9 years, based on the 50th percentile value for years living in current home (USEPA 2011).

The adolescent recreator (fishing, wading, swimming, and boating) is assumed to have an RME ED of 12 years. This is the duration of the assumed adolescent age category (7 to <19 years old). The CTE ED (6 years) is assumed to be one-half of the RME value.

The child recreator (eating fish/crab, wading, and swimming) is assumed to have an RME ED of 6 years. This is the duration of the child age category (1 to <7 years old). The CTE ED (3 years) is assumed to be one-half of the RME value.

Workers

For the adult worker receptor population, the assumed ED is 25 years for the RME scenario, which is based on the 95th percentile for the number of years worked at the same location, as reported by the U.S. Bureau of Labor Statistics in 1990 (USEPA 1991b, 2014), and 7 years for the CTE, which is reported in the USEPA Exposure Factors Handbook (USEPA 2011) as the median occupational tenure of the working population ages 16 and older (men and women).

4.3.9 Body Weights

Receptor body weights are taken from USEPA guidance (USEPA 2011, 2014) and represent the averages for males and females in the applicable age ranges (i.e., 1 to <7 years for child, 7 to <19 years for adolescent, and adult). A body weight of 80 kg is used for adults (USEPA 2014). Body weights for young children and adolescent age groups were derived by averaging the mean body-weight estimates for males and females by year of age from the National Health and Nutrition Examination Survey, as summarized in Table 8-24 of the USEPA Exposure Factors Handbook (USEPA 2011). The mean body weight assumed in the BHHRA is 17 kg for the 1- to <7-year-old child and 52 kg for the 7- to <19-year-old adolescent. The same body weights are used for RME and CTE scenarios.

4.3.10 Chemical-Specific Exposure Parameters

This section presents assumptions used in the BHHRA for exposure parameters that are chemical-specific, including dermal absorption fractions, oral absorption adjustment factors, and factors related to dermal permeability of chemicals in water. Chemical-specific cooking loss factors were presented and discussed in Section 4.3.6.4 above.

4.3.11 Dermal Absorption Fractions

The dermal absorption fraction (DAF) accounts for absorption of chemicals through the skin from dermal contact with sediment. The DAFs for COPCs were compiled from RAGS Part E (USEPA 2004b), consistent with the USEPA Regional Screening Levels (USEPA 2018d) and are presented in Table 4-12. Default DAFs provided in USEPA (2004b) have been used in the BHHRA. The uncertainty associated with using default DAFs is discussed in the uncertainty section of the BHHRA (Section 7).

4.3.12 Oral Absorption Adjustment Factors

Oral relative bioavailability (RBA) is the ratio between the estimated human absorption factor of a chemical (for the specific medium and route of exposure) and the estimated absorption factor for the laboratory study from which the dose-response value was derived (also referred to as absorption adjustment factor). In the BHHRA, as recommended by USEPA (USEPA 1989; 2018d), this factor is assumed to be 100% (RBA = 1) for all chemicals except arsenic. The value for arsenic is assumed to be 0.6 (60%), as derived by USEPA for soils based on a review of over 100 arsenic RBA estimates (USEPA 2012c). The oral RBAs used in the BHHRA are also listed in Table 4-12.

4.3.12.1 Dermal Water Parameters

Estimating chemical intake through dermal contact with surface water is done in the BHHRA by a method discussed by USEPA (USEPA 1989, 2004b); this method uses chemical-specific dermal water parameters, including:

- A dermal permeability coefficient (PC, cm/hr)
- The ratio of the permeability coefficient of a chemical through the stratum corneum relative to its permeability coefficient across the viable epidermis (B, dimensionless)
- Lag time (τ, hours/event)
- Time to steady state (t*, hours).

These parameters are presented in Table 4-13 for the COPCs and are from USEPA guidance (USEPA 2004b), consistent with the USEPA RSLs (USEPA 2018d).

4.4 Exposure-Point Concentrations

Exposure-point concentrations (EPCs) are estimates of the concentrations of COPCs in environmental media at the locations where humans may have contact with these media. EPCs are used to determine the magnitude of potential human exposure, as described in Section 4.3. The methods used to calculate EPCs are presented in the rest of this section. For this BHHRA, EPCs were derived using measurements of COPC concentrations in accessible surface sediment samples, surface water samples, and fish/crab tissue.

4.4.1 Calculation of Exposure-Point Concentrations

In each exposure medium, the EPC for each COPC is defined as the 95% upper confidence limit (UCL) on the mean concentration. The 95% UCL represents a reasonable upper bound on the arithmetic average concentration that is contacted over the exposure period, accounting for uncertainty in estimating the true average concentration at an exposure point; it is used according to USEPA guidance (USEPA RAGS-A Guidance [1989]). In the event the 95% UCL is greater than the maximum reported concentration, the maximum concentration was used as the EPC (this case occurred only once, for PCB-189 in accessible surface sediment).

4.4.1.1 Treatment of Duplicate Values

During the process of calculating EPCs, field duplicates were averaged together with their parent samples. Specifically, if both parent and duplicate samples were detected, or both were non-detects, then the two values were averaged to yield a single combined value (which was assigned qualifier J if both were detects, and qualifier U if both were non-detects). If only one of the parent or duplicate values was detected and the other was non-detect, then the combined value was assigned to be the detected value, and was assigned the qualifier of the detected value (if any). This approach stands in contrast to the approach used while identifying COPCs, wherein duplicate values were treated as independent samples.

4.4.1.2 *Use of ProUCL software*

USEPA's ProUCL software (version 5.1) was used to calculate 95% UCLs. ProUCL takes input consisting of measured values for each COPC in a given medium, with corresponding numerical flags indicating whether each measured value was detected (flag value 1) or a non-detect (flag value 0). Values with qualifier U were assigned detection flag 0; other values (including those with qualifier J) were assigned detection flag 1. (Any values with qualifier R, indicating rejected data, had already been removed from consideration at the stage of identifying COPCs; see section 3.1.) Any non-detect values were entered into ProUCL as originally reported in the data, rather than substituting reporting limits, detection limits, or any fraction thereof. ProUCL automatically identifies the appropriate statistical methods to handle non-detects while estimating EPCs.

ProUCL calculates multiple estimates of the 95% UCL, using multiple parametric distributional assumptions and non-parametric methods, and compares these estimates using goodness-of-fit measures. Ultimately, ProUCL recommends one or more 95% UCL estimates. In some cases, ProUCL's recommended UCL estimate was inappropriate. These included H-UCLs (UCLs based on Land's H-statistic); GROS Adjusted Gamma UCLs (GROS stands for Gamma Regression on Order Statistics); GROS Approximate Gamma UCLs; and any UCL that was not a 95% UCL (e.g., ProUCL occasionally recommends a 97.5% UCL or a 99% UCL, rather than a 95% UCL).

H-UCLs are computed by ProUCL only for reasons of historical comparison, and the ProUCL Technical Guidance explicitly states that the H-UCL should not be used (USEPA 2015a). However, this aspect of the technical guidance has not been implemented in the ProUCL software; the software still occasionally selects the H-UCL as its recommended UCL.

GROS Adjusted Gamma and GROS Approximate Gamma UCLs were considered inappropriate for a different reason. The GROS method is a method for imputing values for non-detects, based on a gamma distribution estimated from the detected values. However, when the data set of detected observations is highly skewed, the GROS method does not perform well, and tends to impute negative values for non-detected values. Because environmental concentration data cannot be negative, ProUCL automatically substitutes any negative imputed values with a constant value of 0.01 (USEPA 2015a). The 0.01 substitution value is hard-coded into the software and cannot be changed. A value of 0.01 was often on an inappropriate scale for the data sets under consideration in this HHRA. As a hypothetical example, the maximum reporting limit for a COPC in fish fillet may have only been $1x10^{-6}$ mg/kg; in this case, substituting non-detect values with 0.01 mg/kg is obviously inappropriate.

ProUCL Technical Guidance (USEPA 2015a) states that GROS should not be used for data sets where the detected observations are highly skewed. The Technical Guidance defines "highly skewed" data as data where the estimated value of one parameter of the gamma distribution, *k*, is less than 1. However, in some cases, data sets did not meet ProUCL's criterion for "highly skewed," and a GROS UCL was recommended, but the GROS UCL was still substantially higher than the general scale of the data, suggesting that one or more substitutions of 0.01 had been made. For example, for 1,2,3,4,7,8-HxCDD in summer flounder fillet samples, a GROS UCL was one of ProUCL's recommended UCLs. For this data set, the parameter *k* was estimated at 3.62, well above the cutoff value of 1 in the ProUCL Technical Guidance, suggesting that the detected data were not “highly skewed.” However, the GROS UCL exceeded the maximum detected value by several orders of magnitude: the maximum detected value was 1.64×10^{-7} mg/kg, but the GROS UCL was 7×10^{-3} mg/kg. Situations like this one caused GROS UCLs to be eliminated from consideration as EPC estimates.

We applied the following algorithm to choose a 95% UCL estimate from those computed by ProUCL.

1. The algorithm selected the maximum ProUCL-recommended UCL that was *not* an H-UCL, a GROS UCL, or a 97.5% or 99% UCL.
2. If no recommended UCL satisfied the conditions in (1), then the algorithm defaulted to selecting the 95% Chebyshev UCL (following guidance in the ProUCL Technical Guidance, where UCLs based on the Chebyshev inequality are considered reasonably stable and conservative estimates for skewed data sets).

For data sets where there were not enough distinct detected values for ProUCL to estimate any UCL, the maximum reported concentration was used as the EPC (whether it was detected or non-detected).

4.4.2 Exposure Areas

Exposure areas are discrete areas of the site over which exposure is expected to occur throughout the duration of exposure. For the HHRA, exposure to accessible surface sediment, surface water (depth up to 3 feet), and fish or crab tissue were assumed to occur over the entirety of Newark Bay (i.e., sitewide [or Bay-wide]).

4.4.3 EPCs for Sediment

EPCs were calculated for COPCs in accessible surface sediment samples on a site-wide basis.

4.4.4 EPCs for Surface Water

EPCs were calculated for COPCs in surface-water samples (near-surface only; i.e., depth up to approximately 3 feet) on a site-wide basis.

4.4.5 EPCs for Fish Tissue

For fish fillets, EPCs were calculated on a site-wide basis. If a chemical was a COPC in any fish species or crab tissue, an EPC was computed in all fish species and crab tissues. Ultimately, species-specific EPCs were averaged across all five fish species to yield an EPC for a mixed-fish diet, assuming that an angler eats approximately equal quantities of fish fillets from each species over the period of exposure.

For each COPC, the mixed-fish diet EPC was calculated by averaging species-specific EPCs, rather than calculating an EPC for all fish fillet data pooled together, because there was not necessarily an equal number of measured values in each fish species. An EPC calculated from pooled fish fillet data would therefore reflect the relative availability of measured values in each fish species, not a diet composed of equal parts of each fish species. For this reason, the mixed-fish diet EPC was calculated by first calculating EPCs for each species separately, and then averaging the species-specific EPCs.

4.4.6 EPCs for Crab Tissue

EPCs for crab tissue were also calculated on a site-wide basis. If a chemical was a COPC in any fish species or crab tissue, an EPC was computed in all fish species and crab tissues. EPCs are computed for the combined muscle/hepatopancreas tissue (assuming 74% muscle and 26% hepatopancreas, by mass (see Attachment A-6 to Appendix A), as well as for muscle tissue only and for hepatopancreas tissue only. Note that for combined muscle/hepatopancreas tissue, the combined COPC concentrations were calculated for each individual sample first, and then EPCs were computed using ProUCL as 95% UCLs based on this data set of combined concentrations. (This stands in contrast to the other possible approach, which would be to calculate muscle EPC and hepatopancreas EPC separately, and then take a weighted average of the two tissue-specific EPCs.)

5. Toxicity Assessment

The intent of the toxicity (and dose-response) assessment is to determine the nature of adverse health effects that may occur with exposure to a certain chemical, and to identify the relationship between the dose of a chemical and the possibility and extent of a potential adverse effect (or response) (USEPA 1989). Cancer risk and noncancer hazard can be estimated by incorporating the outcome of the toxicity assessment with information on the magnitude of potential exposure (developed in the exposure assessment) to provide an estimate of potential risk (provided in the risk characterization).

USEPA designates potential adverse effects as carcinogenic or noncarcinogenic (i.e., effects other than cancer). Dose-response associations are generally defined by USEPA for oral and inhalation exposures. Due to the lack of toxicity data for the dermal exposure route, oral toxicity values adjusted for absorption differences are typically used to evaluate dermal exposures (USEPA 2004b).

Potential noncancer health effects, likely caused by a nonlinear mode of action, are evaluated using oral reference doses (RfDs) and inhalation reference concentrations (RfCs) (USEPA 2018e). Noncancer toxicity values are derived assuming that various toxic consequences (e.g., renal effects) have threshold concentrations. RfDs and RfCs are estimates (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (USEPA 2018e). For characterization of potential noncarcinogenic effects, exposures are classified as chronic (i.e., 7 years to a lifetime) or subchronic (i.e., <7 years) (USEPA 2018f). In USEPA's soil screening-level guidance (USEPA 2002a), the Science Advisory Board indicates that, although a conservative assumption, a child scenario with 6 years of exposure can be paired with a chronic RfD. RfDs are expressed in milligrams of a chemical per kilogram of body weight per day (mg/kg-day); RfCs are in milligrams of a chemical per cubic meter of air (mg/m^3).

Potential cancer effects are evaluated primarily using oral cancer slope factors (CSFs) and inhalation unit risks (IURs). In addition, USEPA has developed weight-of-evidence characterizations for determining human carcinogenicity (USEPA 2018e). CSFs are expressed as risk per mg/kg-day; IURs are expressed as risk per µg/m^3.

The toxicity assessment is presented in the subsections below. Section 5.1 discusses the sources of toxicity data used in the BHHRA. Section 5.2 discusses the noncarcinogenic toxicity factors, and Section 5.3 discusses the carcinogenic toxicity values. Section 5.4 discusses the gastrointestinal absorption values used to adjust oral toxicity factors to evaluate the dermal pathway. Section 5.5 discusses unique toxicity evaluations for dioxins and furans, PCBs, PAHs, arsenic, lead, and mercury.

5.1 Sources of Toxicity Data

Dose-response relationships forming the basis of toxicity factors, particularly older values, are typically derived from laboratory animal experiments. These experiments are often orchestrated to evaluate a small number of animals using high-level doses to increase the chance of a response occurring. Further, the studies are performed under prescribed conditions intended to decrease the impact of confounding factors.

The relatively high doses used in animal studies are then extrapolated to lower concentrations relevant to humans using uncertainty factors (UFs) and toxicological models. Newer methods of deriving toxicity data include high-throughput screening (screening extensive chemical libraries for toxicity), read-across (using information for one chemical to predict toxicity from a similar substance), *in vitro* (e.g., cell culture), and *in silico* (computer simulation) methods.

Toxicity factors used in BHHRA were selected according to USEPA's toxicity factor hierarchy (USEPA 2003a). The first choice for toxicity values is USEPA's Integrated Risk Information System (IRIS), a toxicity database available online. The IRIS program resides within the National Center for Environmental Assessment's (NCEA's) Office of Research and Development (ORD) (USEPA 2018e). Using IRIS guidance, USEPA reviews and assesses toxicological studies on health effects potentially relevant to humans resulting from exposure to various substances. The current IRIS process (NRC 2014) involves selection of the substance for evaluation, problem formulation, systematic review and comprehensive literature search, draft assessment for agency and public review, peer review, and release of the final assessment (https://www.epa.gov/iris/basic-information-about-integrated-risk-information-system#process). USEPA's toxicity factor hierarchy (USEPA 2003a) is as follows:

- Tier 1 — USEPA's IRIS (USEPA 2018e)
- Tier 2 — USEPA's Superfund Health Risk Technical Support Center (STSC) Provisional Peer Reviewed Toxicity Values (PPRTV) (USEPA 2018g)
- Tier 3 — Other toxicity values, such as PPRTV screening values (USEPA 2018g), California Environmental Protection Agency (CalEPA) values, Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) (ATSDR 2018), and Health Effects Assessment Summary Tables (HEAST) toxicity values (USEPA 1997a), with preference given to sources based on approaches similar to those used for Tiers 1 and 2, peer-reviewed values, publicly available values, more recent values, and toxicity factors that are transparent in their development (USEPA 2003a).

The sediment and surface water inhalation pathways were evaluated and excluded from the BHHRA, because the risks and hazards from these pathways are considered negligible (Appendices C-1 and C-2), and inhalation toxicity factors are not relevant in the risk assessment. Therefore, oral RfDs and oral cancer CSFs were used, as well as oral toxicity factors adjusted for dermal absorption. Noncancer toxicity values used in this risk assessment are shown in Table 5-1 (RAGS Part D Table 5.1); cancer toxicity factors are shown in Table 5-2 (RAGS Part D Table 6.1). As depicted in Tables 5-1 and 5-2, most of the toxicity factors used in this assessment are Tier 1 values from the USEPA IRIS database (2018e); PPRTVs (USPA 2018g) are included as Tier 2 values; and Tier 3 values include PPRTV screening toxicity values (USEPA 2018g); values from the CalEPA Toxicity Criteria Database (CalEPA 2018); and values from NJDEP (2009), ATSDR MRLs (2018), and HEAST (USEPA 1997a).

PPRTVs (Tier 2) are used for the following COPCs and toxicity values:

- Aluminum RfD (USEPA 2006a)
- Benzaldehyde CSF (USEPA 2015b)
- Cobalt RfD (USEPA 2008)

- Iron RfD (USEPA 2006b)
- PHC as gasoline RfD (USEPA 2009b)
- TPH (C9-C40) RfD (USPA 2009b).

If toxicity factors are not available from IRIS (Tier 1 source) or the PPRTVs (Tier 2), a Tier 3 source is applicable. PPRTV screening values are derived when sufficient information is not available to derive a PPRTV, but USEPA's Superfund Health Risk Technical Support Center (STSC) has determined that adequate information is available that may be of limited utility to risk assessors. In these cases, the STSC derives a screening value and compiles available data in an appendix (USEPA 2012d, 2017e, 2017f). Therefore, these screening toxicity factors are treated as Tier 3 values. Previously, HEAST was published yearly by USEPA in hard-copy form; the most recent update was in 1997. Therefore, some of these values may be outdated. As discussed in Section 7.3.6, HEAST toxicity factors used in this risk assessment include the CSF for dioxin-like compounds (DLCs) and the RfD for copper.

Per USEPA (2003a), Tier 3 toxicity values were chosen by giving priority to those that are newer, transparent, peer reviewed, and publicly available. Tier 3 toxicity values used in this assessment are as follows:

- 2,4'-DDD — PPRTV screening chronic RfD for 4,4'-DDD (4,4'-DDD used as a toxicity surrogate) (USEPA 2017e)
- 2,4'-DDE — PPRTV screening chronic RfD for 4,4'-DDE (4,4'-DDE used as a toxicity surrogate) (USEPA 2017f)
- 4,4'-DDD — PPRTV screening chronic RfD (USEPA 2017e)
- 4,4'-DDE — PPRTV screening chronic RfD (USEPA 2017f)
- Chloroform — CalEPA CSF (listed by CalEPA as CalEPA 2011, CARB 1990)
    - Note that the CalEPA toxicity criteria database lists an oral CSF of 3.1E-02 mg/kg-day^{-1} (used in this HHRA) and a less conservative inhalation CSF of 1.9E-02 mg/kg-day^{-1}. The documentation cited by CalEPA refers to derivation of only the less conservative inhalation CSF value (CalEPA 2011) and ranges of slope factors (CARB 1990). Further, chloroform is unique, in that the IRIS file states that the RfD is also protective of cancer (USEPA 2018e).
- Chromium (VI) — NJDEP CSF (NJDEP 2009)
- Copper — HEAST RfD (USEPA 1997a)
- Mirex — CalEPA CSF (CalEPA 1992)
- Organic arsenic — ATSDR chronic MRL (used as the RfD) (ATSDR 2007) (see Section 5.5.4 for further information)
- PCDD/Fs and DL-PCBs — HEAST (USEPA 1997a) CSF for TCDD with TEF applied (see Section 5.5.1)
- Thallium — PPRTV screening value chronic RfD (USEPA 2012e) (see Section 5.2 for additional information).

Where toxicity factors were not available from any of the recommended sources, a toxicity factor for a structurally similar compound was assigned as a surrogate (also see Tables 5-1 and 5-2). Based on input from USEPA Region 2 (USEPA 2018a, 2018h) ,USEPA's Superfund Health Risk Technical Support Center

(STSC, USEPA 2015c), as well as surrogates used by AECOM (2017) and Battelle (2018), surrogates were chosen for the following COPCs in the BHHRA.

COPC*	RfD Surrogate	CSF Surrogate
PCDD/Fs and DL-PCBs	Value for 2,3,7,8-TCDD with TEF applied	Value for 2,3,7,8-TCDD with TEF applied
Total Non-DL PCBs (RME)	Aroclor 1254	Polychlorinated Biphenyls (high risk and persistence, upper-bound slope factor)
Total Non-DL PCBs (CTE)	Aroclor 1254	Polychlorinated Biphenyls (high risk and persistence, central-estimate slope factor)
Benz(a)anthracene	--	Value for Benzo(a)pyrene with RPF applied
Benzo(b)fluoranthene	--	Value for Benzo(a)pyrene with RPF applied
Benzo(k)fluoranthene	--	Value for Benzo(a)pyrene with RPF applied
Chrysene	--	Value for Benzo(a)pyrene with RPF applied
Dibenz(a,h)anthracene	--	Value for Benzo(a)pyrene with RPF applied
Indeno(1,2,3-c,d)-pyrene	--	Value for Benzo(a)pyrene with RPF applied
2,4'-DDD	4,4'-DDD	4,4'-DDD
2,4'-DDE	4,4'-DDE	4,4'-DDE
2,4'-DDT	4,4'-DDT	4,4'-DDT
Chlordane, alpha (cis)	Chlordane	Chlordane
Chlordane, gamma (trans)	Chlordane	Chlordane
Heptachlor epoxide, trans-	Heptachlor epoxide	Heptachlor epoxide
Nonachlor, cis-	Value for chlordane with RPF applied	Chlordane
Nonachlor, trans-	Value for chlordane with RPF applied	Chlordane
Oxychlordane	Value for chlordane with RPF applied	Chlordane
PHC as gasoline	Total Petroleum Hydrocarbons (Aromatic Low)	Total Petroleum Hydrocarbons (Aromatic Low)
TPH (C9-C40)	Total Petroleum Hydrocarbons (Aromatic Medium)	Total Petroleum Hydrocarbons (Aromatic Medium)

COPC*	RfD Surrogate	CSF Surrogate
Arsenic, organic	Dimethylarsinic acid	Dimethylarsinic acid
Mercury	Mercuric Chloride	Mercuric Chloride
Nickel	Nickel Soluble Salts	Nickel Soluble Salts
Thallium	Thallium Soluble Salts	Thallium Soluble Salts
Titanium	Titanium Tetrachloride	Titanium Tetrachloride

*Surrogate list above applies to toxicity factors for COPCs evaluated quantitatively in the BHHRA. Additional surrogates were applied to the screening levels used for COPC selection (Appendix B).

RPF — relative potency factor

5.2 Noncarcinogenic Toxicity Assessment

Chemicals associated with noncarcinogenic health effects are assumed to have a threshold (i.e., a level above which an adverse effect may occur, or a level below which no adverse effect is observed). The no-observed-adverse-effect level (NOAEL) is an estimate of the threshold dose. The minimum dose at which an adverse effect has been reported is called the lowest-observed-adverse-effect level (LOAEL). If available, the NOAEL (otherwise, the LOAEL) is employed as the point of departure (POD) for predicting a threshold level in humans based on extrapolations from experimental information. RfDs for chronic exposure to chemicals with noncancer effects have been estimated by USEPA by modifying the NOAEL or the LOAEL with UFs (1997a, 2018e).

More recently, USEPA has employed benchmark dose (BMD) methods to designate the POD for an adverse effect (benchmark response) from experimental studies (USEPA 2012f). The BMD method is a more quantitative option for the initial step in the dose-response assessment than the NOAEL/LOAEL approach. In deriving the BMD, response data are initially modeled within the range of experimental observations, then modeling is used to predict a value below the experimental range. In BMD modeling, the POD is the BMD lower confidence level (BMDL), which is the lower 95% bound on the dose that elicits the adverse effect, usually 10% higher than the control response. Uncertainty inherent in a given experiment is considered via use of the lower bound, which also ensures with 95% confidence that the target benchmark response is not surpassed. The RfD is then derived by applying UFs to the BMDL.

RfDs are derived using the critical (most sensitive) adverse effect in the study, assuming that, if the most sensitive effect does not occur, no other potential toxic effects would occur. USEPA assumes that humans are at least as sensitive to a substance as the most sensitive laboratory species. To account for uncertainties inherent in the relationship between dose and response, the BMDL, NOAEL, or LOAEL is modified by UFs of 1, 3, and/or 10 (USEPA 2002b). UFs are applied to extrapolate from a subchronic to a chronic exposure, extrapolate from a LOAEL to a NOAEL, considering sensitive subpopulations, and using an animal study to derive a human toxicity factor. In addition, a modifying factor (MF) may be used to cover uncertainties in the database or study or that were not considered by other UFs (USEPA 2002b). For the COPCs evaluated in this BHHRA, total UFs range from 1 to 3,000, which is the maximum total UF recommended by USEPA (2002b). The resulting RfDs are considered to be health-protective. Specifically, the RfD represents a level of daily exposure for a lifetime that is likely to be without an appreciable risk of deleterious effects. The smaller the RfD value, the lower is the assumed threshold for noncancer effects; therefore, the compound is considered more toxic.

Table 5-1 provides the noncancer toxicity information for COPCs for the oral and dermal exposure routes. For the applicable COPCs, Table 5-1 lists the Chemical Abstracts Service (CAS) number, oral RfD, TEF for dioxin-like compounds, oral absorption efficiency for the dermal pathway, absorbed RfD for dermal, primary target organ(s), modifying/uncertainty factors, source, date, toxicity factor tier, surrogate, CAS for surrogate, and rationale/reference for surrogate. Adjustments for dermal absorption are discussed in Section 5.4.

The thallium RfD is a PPRTV screening value (USEPA 2012e). A standard PPRTV RfD was not derived due to the poor quality of the database. However, data are available that may be of limited use. Therefore, the Superfund Health Risk Technical Support Center compiled the available information and derived a PPRTV screening RfD. While the screening RfD was used in this risk assessment, it is noted that the thallium hazard quotients (HQs) are particularly uncertain considering the screening RfD. The RfD is based on a subchronic gavage study in rats using thallium soluble salts. The toxicity endpoint is atrophy of hair follicles, because hair follicle atrophy is consistent with episodes of thallium poisoning in humans (USEPA 2012e). However, hair follicle atrophy is not necessarily a toxic effect, which adds uncertainty to the thallium HQ.

The 4,4'-DDD RfD (also used as a surrogate for 2,4'-DDD) is a PPRTV screening value. A standard PPRTV RfD was not derived for 4,4'-DDD due to inadequate data. The existing chronic studies have issues regarding purity of the substance, inadequate number of doses and study animals, and excess mortalities in the study animals. Due to the lack of toxicity data for 4,4'-DDD, USEPA used 4,4'-DDT as a surrogate to derive a PPRTV for 4,4’-DDD (USEPA 2017e). The screening PPRTV is based on a dietary study in rats (Laug et al. 1950, as cited in USEPA 2017e); the same study used to derive the IRIS oral RfD and ATSDR intermediate MRL for DDT. Rats were administered technical-grade DDT dissolved in corn oil in the diet for 15–27 weeks. The critical effect was liver lesions in males and females. The NOAEL (1 ppm [0.05 mg/kg-day]) was selected as the point of departure (POD); this value was converted to a human equivalent dose (HED) of 0.01 mg/kg-day using a dosimetric adjustment factor of 0.27. The resulting HED was divided by an uncertainty factor (UF) of 300 (interspecies UF of 3, intraspecies variability value of 10, database deficiency value of 10), resulting in a PPRTV screening chronic RfD of 3E-05 mg/kg-day (USEPA 2017e).

Similar to 4,4’-DDD above, the 4,4’-DDE RfD (also used as a surrogate for 2,4’-DDE) is a PPRTV screening value. A standard PPRTV RfD was not derived for 4,4’-DDD due to inadequate data. The existing chronic studies have issues regarding adjustment of doses during the studies, excessive long recovery period following exposure, and LOAELs close to mortality levels in some cases (USEPA 2017f). The screening PPRTV is based on a study in rats (Yamasaki et al. 2009, as cited in USEPA 2017f), whereby adult males exposed to DDE during gestation and lactation demonstrated significantly increased relative liver weights. The LOAEL was 5 mg/kg/day; BMD modeling was performed, and the resulting POD (HED) of 1 mg/kg-day was divided by a UF of 3,000 (interspecies UF of 3, intraspecies variability value of 10, LOAEL-to-NOAEL UF of 10, database deficiency value of 10), resulting in a PPRTV screening chronic RfD of 3E-04 mg/kg-day (USEPA 2017f).

The risks and hazards for COPCs with Tier 3 toxicity values are discussed in the uncertainty section (Section 7).

5.3 Carcinogenic Toxicity Assessment

USEPA has issued revised risk assessment guidelines for carcinogens (USEPA 2005b), which replace the previous version (USEPA 1986b). As shown in Table 5-2, many of the COPCs still follow the 1986 classification system; the previous classification system is used until a chemical is reassessed in the IRIS program in accordance with the 2005 Cancer Guidelines. Weight-of-evidence information from animal and epidemiologic studies was used to develop the 1986 classification system:

- Group A — Human Carcinogen (sufficient evidence of carcinogenicity in humans)
- Group B — Probable Human Carcinogen (B1, limited evidence of carcinogenicity in humans; B2, sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans)
- Group C — Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data)
- Group D — Not Classifiable as to Human Carcinogenicity (inadequate or no evidence)
- Group E — Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies).

In the 1986 guidance, USEPA assumed that a specific level of cancer risk is associated with every dose (USEPA 1986b). Mathematical models have been developed by USEPA that extrapolate dose-responses occurring at relatively high doses (used in animal studies) to the lower doses typically experienced by humans. These models assume no threshold for carcinogenic effects and use available animal and/or human data to estimate potency values (CSFs). CSFs are expressed in risk per mg/kg-day (or mg/kg-day^{-1}); therefore, the higher the CSF, the greater the potential for carcinogenicity.

USEPA’s 2005 guidance focuses on evaluating all available information and incorporating mode-of-action (MOA) data (USEPA 2005b). A default, linear low-dose extrapolation may be used if data are lacking. MOA is a series of key processes and events, beginning with interaction of a compound with a cell, proceeding through anatomical and operational changes, and culminating in the development of cancer. MOAs that are expected to be mutagenic are evaluated using linear extrapolation. Other MOAs may be evaluated with either linear or nonlinear methods following careful review of available information per the 2005 guidance. USEPA’s 2005 guidance details a weight-of-evidence description instead of the 1986 classification system. USEPA (2005b) includes the following descriptors along with the weight-of-evidence discussion:

- Carcinogenic to humans — indicates strong evidence of human carcinogenicity
- Likely to be carcinogenic to humans — used when the weight of evidence demonstrates carcinogenic potential for humans
- Suggestive evidence of carcinogenic potential — appropriate when the weight of evidence suggests carcinogenicity; a concern for potential carcinogenicity in humans is raised, but the data are insufficient for a substantial conclusion

- Inadequate information to assess carcinogenic potential — used when available data are not adequate for assigning one of the other descriptors
- Not likely to be carcinogenic to humans — appropriate when the available data are robust for determining that there is no basis for concern regarding human carcinogenicity.

When a compound's effects vary by exposure route or dose, more than one descriptor can be applied. The narrative descriptions reflect significant advances in cancer risk assessment, but the newer evaluation has not yet been performed for many compounds. Therefore, the 1986 grouping classification is still included in IRIS and is provided here for COPCs that are classified under the previous system. Therefore, consistent with classification information for each chemical on IRIS, both classification systems are provided in Table 5-2.

Table 5-2 provides the cancer-based toxicity information for COPCs for the oral and dermal exposure routes. For the applicable COPCs, Table 5-2 lists the CAS number, oral CSF, TEF for dioxin-like compounds, relative potency factor (RPF) for carcinogenic PAHs, oral absorption efficiency for the dermal pathway, absorbed CSF for the dermal route, mutagenicity classification, weight-of-evidence/cancer guideline description, weight-of-evidence classification system, source, date, toxicity factor tier, surrogate, CAS for surrogate, and rationale/reference for surrogate. Adjustments for dermal absorption are discussed in Section 5.4.

Cancer risks from chemicals that act via a mutagenic MOA are assessed in a manner different from chemicals that do not have a mutagenic MOA (USEPA 2005c). Dose-response values are typically based on the linearized multistage (LMS) model for carcinogens classified as mutagenic; this infers that cancer risks are linear in the low-dose area of the curve (USEPA 2005b, 2005c). Per USEPA's Cancer Guidelines and Supplemental Guidance for Assessing Susceptibility for Early-Life Exposure to Carcinogens (USEPA 2005c), age-dependent adjustment factors (ADAFs) have been applied to risk calculations in this BHHRA for COPCs with a mutagenic MOA. These chemicals include carcinogenic PAHs, chromium(VI), and trichloroethene. Potential contributions to lifetime cancer risk from early-life exposures to these mutagenic COPCs is detailed in the risk characterization (Section 6) and uncertainty evaluation (Section 7). Mutagenic COPCs were identified using the National Toxicology Program's (NTP's) Report on Carcinogens, Fourteenth Edition (NTP 2016). However, per USEPA IRIS (2018e), chromium(VI) has a potentially mutagenic MOA for only the inhalation exposure route; not oral or dermal. Because IRIS does not provide an oral CSF for chromium(VI), a Tier 3 value from NJDEP (2009) is used in the risk assessment. Chromium(VI) is conservatively assessed as a mutagen for the oral and dermal exposure routes in the BHHRA, even though NJDEP's (2009) documentation states that there is no firm evidence of a mutagenic MOA. However, USEPA's draft toxicological review of chromium(VI) (USEPA 2010b) indicates that a mutagenic MOA is relevant to humans and is adequately confirmed in laboratory animals; therefore, early-life susceptibility is relevant, and ADAFs should be applied to the cancer risk calculations. Note that USEPA is in the process of re-evaluating hexavalent chromium using the IRIS process.

As indicated by USEPA (2005c), the following ADAFs are applied to carcinogenic PAHs, trichloroethene, and chromium(VI) in the BHHRA:

- Age <2: ADAF = 10
- Age 2<16: ADAF = 3
- Age ≥16: ADAF = 1

As shown in Table 5-3, age-weighted ADAF values were calculated for the child and adolescent age groupings based on the respective exposure duration. For RME, ADAFs were averaged across the entire age of the receptor. For CTE, exposure was assumed to take place during the latter part of the child's age range. Appendix F (RAGS Part D Table 7 Series — Calculation of Chemical Risks and Noncancer Hazards) shows the chemicals identified as mutagens and details the age-specific ADAFs. The footnotes below the tables show how the ADAFs are incorporated into the cancer risk equation and list the ADAFs applicable to each age group (child, adolescent, adult).

5.4 Gastrointestinal Absorption Efficiency

No dermal toxicity factors are available for the COPCs in this risk assessment; therefore, oral dose-response values are used to evaluate the dermal exposure pathway. The algorithm for estimating dermal absorption gives rise to an absorbed dose, necessitating adjustment of the oral toxicity value to account for an absorbed dose instead of an administered dose. This modification accounts for the absorption efficiency in the gastrointestinal tract in the critical toxicity study that forms the basis of the non-carcinogenic or carcinogenic toxicity factor. For example, in the situation where oral absorption in the critical study is virtually 100% (complete), the absorbed dose is equal to the administered dose; therefore, no adjustment is necessary. USEPA (2004b) recommends adjustment factors for oral toxicity factors. No adjustment is made for the organic COPCs, because their gastrointestinal absorption is relatively high. As can be seen in Tables 5-1 and 5-2, several of the inorganic COPCs are adjusted for gastrointestinal absorption in deriving the dermal toxicity factors. These inorganics are antimony, cadmium, chromium, manganese, mercury, nickel, silver, and vanadium.

5.5 Chemical-Specific Discussion

The toxicity assessment for particular chemicals or chemical classes with unique toxicological considerations in the risk assessment is discussed in the subsections below:

- Dioxins and Furans (Section 5.5.1)
- PCBs (Section 5.5.2)
- PAHs (Section 5.5.3)
- Arsenic (Section 5.5.4)
- Lead (Section 5.5.5)
- Mercury (Section 5.5.6).

5.5.1 Dioxins and Furans

Dioxins and furans are determined to be COPCs in fish and crab tissue, accessible surface sediment, and surface water. Because these compounds are present in complex mixtures, the toxicity of 2,3,7,8-TCDD, the most heavily studied of the dioxins and furans, is used as the index for the other members of the group. Seven chlorinated dioxin and ten chlorinated furan congeners bind to the aryl hydrocarbon (Ah) receptor and therefore have a toxic mechanism similar to TCDD. The World Health Organization (WHO) has derived TEFs to normalize the potency of each of the 17 congeners to that of TCDD (Van den Berg et al. 2006). In 2010, USEPA recommended these 2005 WHO consensus TEFs for risk assessment purposes (USEPA 2010a). 2,3,7,8-TCDD has a TEF of 1; USEPA's recommended TEFs are listed in the table below.

Congener	WHO 2005 TEF
Chlorinated dibenzo-p-dioxins	
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	1
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.0003
Chlorinated dibenzofurans	
2,3,7,8-TCDF	0.1
1,2,3,7,8-PeCDF	0.03
2,3,4,7,8-PeCDF	0.3
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.0003
Source: Van den Berg et al. 2006, USEPA 2010	

In this BHHRA, the above TEFs were applied to the 2,3,7,8-TCDD toxicity factor to derive congener-specific CSFs and RfDs (see Tables 5-1 and 5-2). Specifically, the 2,3,7,8-TCDD CSF was multiplied by the TEF to determine the congener-specific CSFs, and the TCDD RfD was divided by the TEF to calculate the congener-specific RfD. Therefore, the EPCs reflect the measured concentration of each congener (no TEF applied), because the TEF was applied later at the toxicity factor step. TCDD-TEQ risks and hazards were calculated by summing the congener-specific risks and hazards. Risks and hazards are presented for individual dioxin/furan congeners, total PCDD/Fs, and total DLCs, which include dioxin-like PCBs (see below).

Potential carcinogenic effects of TCDD-TEQ are evaluated using the USEPA (1997a) HEAST CSF of 150,000 $(mg/kg\text{-}day)^{-1}$, per USEPA (1996b, 2018a, 2018b). The uncertainty evaluation (Section 7.3.6) discusses additional cancer toxicity values that are available for TCDD. Potential noncancer effects of TCDD-TEQ are evaluated using the USEPA IRIS (2018e) RfD of 7E-10 mg/kg-day.

USEPA (2013) states that the TEF method is most applicable to oral exposures for sediment, soil, fish, and water contaminated with 2,3,7,8-TCDD and DLCs. As an estimate, TEFs may be used for other exposure routes (i.e., inhalation, dermal), but the relative contribution of the various exposure routes to the TEQ should be determined (USPA 2013). Van den Berg et al. (2006) notes that there is more uncertainty in applying TEFs to abiotic samples (e.g., sediment, surface water) than to biotic media (e.g., fish, crab). USEPA (2013) recommends that the portion of the total TEQ from 2,3,7,8-TCDD (which has relatively low uncertainty) and from DLCs (which has higher uncertainty) be determined.

5.5.2 Polychlorinated Biphenyls (PCBs)

Total non-dioxin-like PCBs (Total Non-DL PCBs), as well as DL-PCB congeners, are COPCs in fish and crab issue, accessible surface sediment, and surface water. Data on PCB congeners, as well as Aroclors, have been collected during the NBSA RI program. The Aroclor data were not used in the BHHRA but are included in Appendix A as additional information. The total non-DL PCB EPCs were calculated by combining the appropriate concentrations of the individual non-DL PCB congeners. The methods used to estimate carcinogenic risks and noncarcinogenic hazards associated with non-DL PCBs and DL-PCBs in the BHHRA are described in the sections below.

5.5.2.1 Total Non-Dioxin Like PCBs Approach

Total non-DL PCBs are evaluated using the USEPA IRIS (2018e) toxicity values for PCB mixtures and certain Aroclors. The method for evaluating carcinogenic effects is detailed first below, followed by noncarcinogenic effects.

<u>Carcinogenic Effects</u>

In IRIS, USEPA (2018e) identified three tiers of oral CSFs for assessment of total PCBs: (1) high risk and persistence, (2) low risk and persistence, and (3) lowest risk and persistence. The selection of a particular CSF varies with PCB chlorine content, as well as exposure route and medium. USEPA recommends the upper-bound oral CSF [2 $(mg/kg\text{-}day)^{-1}$] and central-estimate oral CSF [1 $(mg/kg\text{-}day)^{-1}$] for food-chain exposures (i.e., fish and crab ingestion), as well as sediment ingestion. The PCB CSFs are determined from animal cancer bioassays using PCB mixtures. Therefore, the observed toxic effects are due to combined effects of the mixtures on the whole animal (including dioxin-like toxicity, see below). Based on the range of CSFs in IRIS (USEPA 2018e) and comments from USEPA (2018a), cancer risks from total NDL-PCBs are evaluated as follows:

- All RME Scenarios, Exposure Pathways
  - High risk and persistence, upper-bound CSF of 2 $(mg/kg\text{-}day)^{-1}$ — ingestion of fish and crab, incidental ingestion of sediment, dermal contact with sediment, incidental ingestion of surface water, dermal contact with surface water
- All CTE Scenarios, Exposure Pathways
  - High-risk and persistence, central estimate CSF of 1 $(mg/kg\text{-}day)^{-1}$ — ingestion of fish and crab, incidental ingestion of sediment, dermal contact with sediment, incidental ingestion of surface water, dermal contact with surface water.

Noncarcinogenic Effects

While USEPA has not derived an oral RfD for PCBs as a group, the Agency has performed threshold effect evaluations for the following individual PCB mixtures: Aroclor 1254, 1016, and 1248 (USEPA 2018e). USEPA IRIS (2018e) has published an oral RfD of 2E-05 mg/kg-day (for Aroclor 1254) and an oral RfD of 7E-05 mg/kg-day (for Aroclor 1016). USEPA (2018e) also reviewed Aroclor 1248 data but did not derive an RfD.

The IRIS (USEPA 2018e) Aroclor 1254 RfD is used to estimate the noncancer effects of total NDL-PCBs. While no guidance is available instructing assessors on the choice between the Aroclor 1254 RfD vs. Aroclor 1016 RfD, the oral RfD for the Aroclor that most closely resembles the congener in the environmental media of concern should be used. The RfD for Aroclor 1254, typically used in HHRAs and the more conservative of the two Aroclor toxicity factors, has been chosen for the NBSA to assess total NDL-PCBs in all media. USEPA is currently evaluating potential noncarcinogenic effects of PCB mixtures using the IRIS process (USEPA 2018e).

5.5.2.2 Dioxin-Like PCBs Approach

Potential risks/hazards have been determined separately for the dioxin-like congeners vs. total non-DL PCBs. The method for evaluating carcinogenic effects is detailed first below, followed by noncarcinogenic effects.

Carcinogenic Effects

A subset of PCB congeners has a mechanism of action similar to that of TCDD (USEPA 1996b, 2010a; Van den Berg et al. 2006). The classification as a “dioxin-like compound” (DLC) is based on a substance’s ability to bind to the Ah receptor, as well as similarities in bioaccumulation ability and biochemical characteristics. Twelve coplanar PCBs are identified as being dioxin-like; they each have at least four chlorine atoms with one or zero substitutions at ortho positions. The coplanar PCBs do not have ortho chlorines on either ring, which allows the rings to be positioned in the same plane, but with a flexible conformation. WHO (Van den Berg et al. 2006) derived TEFs to normalize the potency of each of the 12 congeners to that of TCDD, and USEPA (2010a) also recommends these values. USEPA’s recommended TEFs are listed in the table below:

Congener	WHO 2005 TEF
Non-ortho–substituted PCBs	
PCB-77	0.0001
PCB-81	0.0003
PCB-126	0.1
PCB-169	0.03
Mono-ortho–substituted PCBs	
PCB-105	0.00003
PCB-114	0.00003
PCB-118	0.00003
PCB-123	0.00003
PCB-156	0.00003
PCB-157	0.00003
PCB-167	0.00003
PCB-189	0.00003
Source: Van den Berg et al. 2006, USEPA 2010a	

Consistent with the TEQ method discussed in Section 5.5.1 for TCDD-TEQ, PCB-TEQs have been calculated using the above TEFs for the 12 coplanar PCBs (USEPA 2010a). Potential cancer risks posed by the DL-PCB congeners are determined using the HEAST (USEPA 1997a) 2,3,7,8-TCDD CSF [150,000 $(mg/kg\text{-}day)^{-1}$] and applying the respective TEF. The remaining PCB congeners reported in the analytical data that are not dioxin-like are combined and included in the total non-DL PCB EPCs.

Noncarcinogenic Effects

Similar to the cancer approach, potential noncarcinogenic hazards posed by the DL-PCB congeners are calculated by using the USEPA IRIS (2018e) 2,3,7,8-TCDD RfD of 7E-10 mg/kg-day and applying the congener-specific TEF. As stated in the section above, the remaining PCB congeners reported in the analytical data that are not dioxin-like were combined and included in the total non-DL PCB EPCs.

5.5.3 Polycyclic Aromatic Hydrocarbons (PAHs)

Various PAHs are identified as COPCs in biota/tissue, sediment, and surface water. One PAH is not carcinogenic (naphthalene); the other PAHs are the seven carcinogenic PAHs identified by USEPA (1993). The following PAHs have been identified as COPCs in the BHHRA:

PAHs as COPCs		
PAH	**Carcinogenic/Noncarcinogenic**	**COPC in Medium**
Benz(a)anthracene	Carcinogenic	Biota, Sediment, Surface Water
Benzo(a)pyrene	Carcinogenic	Biota, Sediment, Surface Water
Benzo(b)fluoranthene	Carcinogenic	Biota, Sediment, Surface Water
Benzo(k)fluoranthene	Carcinogenic	Sediment, Surface Water
Chrysene	Carcinogenic	Biota, Sediment, Surface Water
Dibenz(a,h)anthracene	Carcinogenic	Biota, Sediment, Surface Water
Indeno(1,2,3-c,d)-pyrene	Carcinogenic	Biota, Sediment, Surface Water
Naphthalene	Noncarcinogenic	Surface Water

Benzo(a)pyrene (BaP) is the most studied of the PAHs; it is the only one of the carcinogenic PAHs with adequate data for USEPA's derivation of toxicity values. USEPA recently re-evaluated BaP toxicity and published a new IRIS file in 2017 (USEPA 2017g, 2018e). The current BaP CSF [(1 mg/kg-d^{-1})] is based on benchmark dose modeling of rodent tumor data. The BaP IRIS file contains an oral RfD (3E-04 mg/kg-d), also based on benchmark dose modeling of rodent data (USEPA 2017g, 2018e). Per USEPA (1993), relative potency factors (RPFs) are used to assess the carcinogenic potency of the other six carcinogenic PAHs compared to BaP. The latest USEPA evaluation indicates that BaP is carcinogenic to humans and has a mutagenic MOA (USEPA 2017g). By extension, the other six carcinogenic PAHs are also considered human carcinogens and mutagenic. An oral CSF specific to each carcinogenic PAH is calculated by multiplying the BaP CSF by its RPF. The current USEPA RPFs and calculated CSFs are shown below.

PAH	Relative Potency Factor (USEPA 1993)	Oral Cancer Slope Factor (mg/kg-day)-1	CSF Source
Benz(a)anthracene	0.1	1.0E-01	BaP CSF x RPF
Benzo(a)pyrene	1.0	1.0E+00	USEPA 2018e
Benzo(b)fluoranthene	0.10	1.0E-01	BaP CSF x RPF
Benzo(k)fluoranthene	0.01	1.0E-02	BaP CSF x RPF
Chrysene	0.001	1.0E-03	BaP CSF x RPF
Dibenz(a,h)anthracene	1.0	1.0E+00	BaP CSF x RPF
Indeno(1,2,3-c,d)-pyrene	0.1	1.0E-01	BaP CSF x RPF
Naphthalene	--	--	--

CSF — cancer slope factor
RPF — relative potency factor

As stated above, IRIS provides a BaP oral RfD (USPEA 2018e). Oral RfDs have not been derived for the other carcinogenic PAHs; RPFs are not appropriate for noncarcinogenic evaluations so RfDs are not used for the other six carcinogenic PAHs.

USEPA IRIS (2018e) provides an oral RfD of 2E-02 mg/kg-day for naphthalene; this value is used in the BHHRA.

5.5.4 Arsenic

Crab and fish tissue samples collected from the Newark Bay Study Area were analyzed for total arsenic, which includes both inorganic and organic arsenic, whereas the USEPA cancer slope factor and reference dose values are specifically for the more toxic inorganic arsenic. This distinction is important for assessing the potential risk associated with ingestion of arsenic in crab and fish tissues, because the less toxic organic arsenic predominates in these tissues. The various organic arsenic compounds in fish and crab (e.g., monomethylarsonic acid [MMA)] dimethylarsinic acid [DMA], arsenosugars, arsenobetaine, arsenolipids, arsenocholine) are far less toxic or basically non-toxic to humans (ATSDR 2007).

USEPA states in its Technical Summary of Information Available on the Bioaccumulation of Arsenic in Aquatic Organisms that the consensus in the literature is that approximately 10% of arsenic is present as inorganic arsenic in marine fish and shellfish (USEPA 2003c). USEPA (2003c) further states that, while less is known about arsenic speciation in freshwater fish and shellfish, it is believed that 10% or less of arsenic is present as inorganic arsenic. Although federal water quality criteria for arsenic do not apply this or any assumption about the proportion of total arsenic present as inorganic arsenic, the 10% factor has been applied by the Oregon Department of Environmental Quality (ODEQ) in developing arsenic water quality criteria, which were accepted by USEPA (ODEQ 2011). ODEQ notes that other states have also used an “inorganic proportion factor,” including USEPA Region 6 and the State of Colorado (which both use a 30% inorganic factor), and the State of Maryland (which uses a 4% inorganic factor). Moreover, ODEQ also cites several studies in freshwater fish that report a range of inorganic proportions from 0.5% to 10%. A GSH analysis of LPRSA BHHRA (AECOM 2017) data in blue crab suggests that the average inorganic arsenic proportion is on the order of 1% in those samples. Rough modeling of NBSA arsenic data using LPRSA arsenic data yielded a worst-case tissue value of 2% of total arsenic present as inorganic arsenic (in hepatopancreas). Accordingly, the 10% inorganic proportion recommended by ODEQ was used in this BHHRA. Therefore, for fish and crab tissues, it was assumed that 10% of total arsenic is in the inorganic form, and 90% is organic arsenic.

Note that arsenic present in sediment and surface water is evaluated as inorganic arsenic. Inorganic arsenic is identified as a COPC in sediment and surface water; both inorganic and organic arsenic are identified as COPCs in biota. For inorganic arsenic, the IRIS oral CSF (1.5E+00 [mg/kg-day]-1) and IRIS oral RfD (3E-04 mg/kg-day) were used (USEPA 2018e). Organic arsenic was evaluated using the ATSDR MRL for DMA (2E-02 mg/kg-day) (ATSDR 2007).

5.5.5 Lead

Lead is a COPC in accessible surface sediment, and fish and crab tissues. Appendix E contains the lead evaluation and details the blood lead models used (USEPA 1994a, 2003b, 2017d).

5.5.6 Mercury

Mercury has been speciated in samples collected from all media—sediment, surface water, and biota—with measurements for mercury and methyl mercury. Mercury is a COPC in sediment, surface water, fish, and crab; methyl mercury is a COPC in fish and crab. Three forms of mercury are applicable for HHRAs:

- Divalent inorganic mercury (usually assumed to be mercuric chloride)
- Methyl mercury (organic mercury)
- Elemental mercury vapor.

The different forms of mercury vary in their health effects and their respective toxicity values.

In sediment, mercury can exist as organic complexes, mercury hydroxide ($Hg(OH)_2$), mercuric chloride ($HgCl_2$), mercuric oxide (HgO), or mercuric sulfide (HgS) (USEPA 1997b). Of these compounds, only $HgCl_2$ has a USEPA-derived toxicity factor. In a water column, the majority of mercury is present as divalent mercury in a complex with dissolved organic carbon; <10% of the total mercury is present as a methyl mercury complex. However, nearly all of the mercury present in fish muscle tissue is in the methylated form (USEPA 1997b). Elemental mercury exposure occurs primarily via inhalation, because it exists as a vapor (USEPA 1997b), but inhalation is not a complete exposure pathway in this BHHRA.

Both mercury and methyl mercury were detected and identified as COPCs in all crab tissue types and all species of fish. Mercury is identified as a COPC in sediment and surface water. Methyl mercury hazards were evaluated using the USEPA IRIS RfD of 1E-04 mg/kg-day (USEPA 2018e); mercury hazards were assessed using the IRIS RfD for mercuric chloride (3E-4 mg/kg-day) (USEPA 2018e).

6. Risk Characterization

In the risk characterization step of the BHHRA, possible threats to human health related to potential exposure to COPCs in environmental media are determined. Specifically, the quantitative exposure factors derived in the Exposure Assessment (Section 4.0) are meshed with the chemical-specific toxicity factors for COPCs (Section 5.0). In assessing carcinogenic effects, estimated intakes and cancer toxicity factors are integrated to calculate the probability that a person will develop cancer; in determining noncarcinogenic effects, projected intakes of COPCs are compared to the noncarcinogenic toxicity factor. Cancer risk is determined by averaging exposure over a 70-year lifetime[4]; noncarcinogenic hazard is assessed by averaging exposure over the exposure duration (USEPA 1989).

Potential cancer risks and noncancer hazards are determined using different methods. This variation is due to the assumption that potential carcinogens act by a no-threshold MOA, but noncarcinogens are assumed to have a threshold; a level below which no response is expected to occur. Thus, in the cancer assessment, risk of developing cancer is calculated using the CSF, while in the noncarcinogenic evaluation, it can be determined whether the dose is above or below the threshold concentration (e.g., RfD). CSFs and RfDs are outlined in Section 5.0. The method for characterizing carcinogenic risks is discussed in Section 6.1, and the steps to characterize noncarcinogenic hazards are found in Section 6.2. Section 6.3 displays the results of the risk characterization. Section 6.4 discusses selection of potential Chemicals of Concern (potential COCs). Risk and hazard calculations are presented in RAGS Part D format (Table 7 series) in Appendix F.

6.1 Carcinogenic Risk Characterization

The carcinogenic risk characterization predicts the upper-bound probability that a person will develop cancer during their lifetime due to exposure to a COPC in a particular environmental medium or combined environmental media. This probability is a function of the dose of the COPC (see Exposure Assessment, Section 5.0) and the chemical-specific toxicity value (CSF) (see Toxicity Assessment, Section 4.0). The excess lifetime cancer risk (ELCR) is the incremental chance of developing cancer as a result of exposure to site-related COPCs. As indicated by “incremental” and “excess,” the calculated risks estimate the likelihood of developing cancer in addition to typical cancer risks experienced by a population.

The equation below shows how the ELCR is calculated from the estimated lifetime average daily dose (LADD) of a COPC (USEPA1989):

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4 Current human lifetime values of 78 years for males and females, 75 years for males, and 80 years for females are included in USEPA’s (2011) Exposure Factors Handbook. If these values were used for cancer risk assessment instead of the 70-year lifetime, risks would decrease by 10% for males and females, 7% for males, and 13% for females. The standard default lifetime assumption remains 70 years, but USEPA’s National Center for Environmental Assessment is reviewing this value (USEPA 2014).

$$ELCR = 1 - e^{(-CSF\ x\ Lifetime\ intake)} \qquad \text{Equation 6-1}$$

where:

ELCR = excess lifetime cancer risk

CSF = cancer slope factor

When CSF multiplied by the lifetime intake greatly exceeds 1, the ELCR approaches 1 (100% probability of developing cancer). Alternatively, when CSF multiplied by the lifetime intake is <0.01 (1/100 chance of cancer occurring), Equation 6-1 is approximated by Equation 6-2, which was used for calculating cancer risks in this BHHRA:

$$ELCR = Lifetime\ intake\ (mg/kg - day)\ x\ CSF\ (mg/kg - day)^{-1} \qquad \text{Equation 6-2}$$

where:

ELCR = excess lifetime cancer risk

CSF = cancer slope factor

The ELCR is a unitless, upper-bound estimate of the cancer risk potentially resulting from a person's exposure to that COPC by a particular exposure pathway. For mutagenic COPCs, the LADD is multiplied by the age-appropriate ADAF (see Section 5.3).

For a receptor, total cancer risks are calculated by adding risks across all applicable chemicals and exposure pathways. In addition to calculation of total risks for each receptor age group, the child and adult age group cancer risks are added together. This cancer risk across age groups represents potential total risks to a person who is exposed to site COPC(s) over the entire residential exposure duration of 26 years (6 years as a child plus 20 years as an adult for the RME scenario; for the CTE scenario, 3 years as a child plus 9 years as an adult, for a total of 12 years). The adult-plus-child scenario was included for cancer risks at the request of USEPA (2017a), in lieu of including an age-adjusted scenario. Carcinogenic risks for a combined adult/child receptor are estimated for the angler, swimmer, and wader scenarios.

Although it is generally accepted that all potential carcinogens do not likely affect the same target organ(s) nor act by the same MOA, human health risk assessments assume that cancer risks are cumulative or additive (USEPA 2005b). For each receptor, risks have been added across chemicals and exposure pathways to calculate the potential total site cancer risk for the particular receptor, regardless of the target organs for the various carcinogenic COPCs.

USEPA guidance (1991d) provides recommendations on target risk levels for reviewing risk assessment cancer-based results. Per USEPA (1991d), "The upper boundary of the risk range is not a discrete line at 10^{-4}, although USEPA generally considered acceptable if justified based on site-specific conditions." and

"Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4}, and the noncarcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts."

The total ELCR for each receptor is evaluated against the NCP risk range of 10^{-6} to 10^{-4} (i.e., cancer risk of one in one million to one in ten thousand) (USEPA 1990). Based on USEPA (1991d), a cumulative cancer risk level of 10^{-4} will be used to evaluate the total risks in the BHHRA. If a receptor's total cancer risk is below 10^{-4}, no further action or evaluation is believed to be necessary (based on potential cancer risks). However, if a receptor's total cancer risk is greater than the acceptable risk range of 10^{-4}, COPCs with individual pathway risks exceeding 10^{-6} become potential COCs. Note that cumulative noncarcinogenic hazards must also be examined in determining the possible need for remediation (see below).

6.2 Noncarcinogenic Risk Characterization

The HQ is a unitless ratio calculated to determine a chemical's potential to result in noncarcinogenic health effects at a level of concern. The receptor-specific HQ is calculated by dividing the chronic intake by the RfD for a certain COPC, as shown in the following equation:

$$HQ = \frac{Chronic\ Intake\ (mg/kg - day)}{RfD\ (mg/kg - day)}$$

where:

HQ = hazard quotient

RfD = reference dose

An HQ $\leq$1 indicates that chronic intake does not exceed the RfD and adverse noncancer health effects are not anticipated (USEPA 1989, 1991d). While an HQ that exceeds 1 may indicate the possibility of adverse noncancer effects occurring, the level of exceedance cannot be correlated directly to an effect level or likelihood.

The HQs for the individual COPCs are summed to calculate the total hazard index (HI). Receptor-specific, total site HIs are calculated by adding the HIs for the exposure pathways relevant to the particular receptor. Per USEPA guidance, HIs by target organ are also calculated, because noncancer effects are typically summed by target organ (see RAGS D Table 9 and 10 series [Appendix G and I, respectively]) (USEPA 1989).

Summaries of all HIs for each receptor are presented and compared to an HI of 1, per USEPA (1991d). The summary tables depict both the total HI and the HI for each target organ. If a COPC results in an exceedance of the HI of 1 for a certain target organ for a receptor, the chemical becomes a potential COC. If a receptor's cumulative HIs are <1, no additional action or evaluation is believed to be necessary (based on noncancer hazards). Note that cumulative cancer risks must also be examined in determining the possible need for remediation (see above). Where the cumulative target-organ effect HI for a receptor is greater than 1, the goal of protection of an HI equal to 1 has been exceeded. In these cases, potential COCs are identified as those COPCs with individual pathway HQs greater than 0.1. However, if a receptor's total target-organ effect HI is greater than the acceptable value of 1, COPCs with individual pathway HQs exceeding 0.1 become potential COCs.

6.2.1 Risk Characterization for Lead

Lead was identified as a COPC in accessible surface sediment and crab muscle/hepatopancreas tissue. Predicted blood lead levels (PbBs) for children and adults are compared to the Centers for Disease Control (CDC) lead level of concern of 5 micrograms per deciliter (µg/dL) (CDC 2012). The predicted PbBs are also put into context with USEPA's regulatory target of 95% of children in a population having PbBs below 10 µg/dL. The lead risk assessment is presented in Appendix E; the results for each receptor are summarized in Section 6.3.6.

6.3 Risk Characterization Results

The results of the risk characterization for each receptor are presented below. Estimated cancer risks exceeding 10^{-4} and/or noncancer hazard indices exceeding 1 are highlighted. The supporting calculations for both the RME and CTE scenarios are presented in the RAGS Part D Table 7 format in Appendix F, including COPC-specific risks and hazards for each receptor, medium, and exposure pathway. Additionally, the analysis of HIs greater than 1 on a target-organ basis for both the RME and CTE scenarios are presented in the RAGS Part D Table 9 format in Appendix G. Finally, tables showing the percent contribution of each COPC to the total risk are presented in Appendix H for fish or crab consumption by the angler/sportsman only, because the risks/hazards associated with exposure to sediment and surface water are on the order of 100-fold lower or more than those associated with fish or crab consumption.

It is important to note that two sets of cancer risks and noncancer hazards were estimated: (1) using USEPA's Kaplan-Meier (KM) calculator to derive the TEQ concentrations for PCDDs and DL-PCBs (Version 9.1; issued July 2014) and applying the toxicity criteria for 2,3,7,8-TCDD, and (2) manually calculating the TEQ DF and TEQ PCB based on the concentration of each congener and applying the appropriate TEF to the toxicity criteria for 2,3,7,8-TCDD in the risk calculation. The former cancer risk values are referred to in the text and tables as "Total PCDD/Fs (based on KM TEQ)" and "Total DL-PCBs (based on KM TEQ)," whereas the latter values are referred to as "Total PCDD/Fs (excluding KM TEQ)" and "Total DL-PCBs (excluding KM TEQ)." Cumulative risk and hazard estimates are also designated "Total (based on KM TEQ)" or "Total (excluding KM TEQ)." Both sets of estimates are presented in the RAGS Part D tables (Appendix F for Table 7s and Appendix G for Table 9s), and in the receptor-specific tables below. The purpose of this dual approach was to allow evaluation of which specific congeners were the predominant risk drivers, which would not be possible by estimating risks/hazards based on the KM TEQ alone.

6.3.1 Angler/Sportsman

Anglers/sportsmen are assumed to be exposed to COPCs in fish or crab self-caught in the NBSA via ingestion, to COPCs in accessible surface sediment and surface water via dermal contact and incidental ingestion. Three age groups were evaluated: a child (1 to <7 years), an adolescent (7 to 19 years), and an adult (>18 years). While children were assumed to consume fish or crab caught by an adult or adolescent angler/sportsman, exposure to sediment and surface water was not evaluated for a child angler/sportsman, because (1) children would not be expected to accompany adolescents or adults very often, if at all, due to safety concerns, and (2) any exposure would be less than that experienced by children who visit the NBSA to wade or swim.

Potential cancer risks and noncancer hazards associated with adolescent and adult angler/sportsman exposure to accessible surface sediment and surface water were estimated on a site-wide (or Bay-wide) basis. These values are summed with those for ingestion of fish or crab to estimate cumulative cancer risks and noncancer hazards for these receptors. Cumulative site-wide cancer risks and noncancer hazards for the angler/sportsman receptor are presented in Tables 6-3 through 6-6; results for each age group are discussed below.

6.3.1.1 Angler/Sportsman — Child

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the child angler/sportsman. Values that exceed the NCP risk range of 10^{-6} to 10^{-4} or an HI of 1 are bolded.

Angler/Sportsman Child (Age 1 to <7)						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Fish Tissue	9.3	Mixed Fish Diet (a)				
		Total without KM TEQ (b)	**3E-04**	**4E+01**	9E-06	**3E+00**
		Total with KM TEQ (c)	**3E-04**	**4E+01**	9E-06	**4E+00**
Crab Tissue	9.3	Crab Muscle & Hepatopancreas				
		Total without KM TEQ (b)	**3E-04**	**3E+01**	2E-05	**5E+00**
		Total with KM TEQ (c)	**3E-04**	**3E+01**	2E-05	**5E+00**

(a) Mixed fish diet composed of equal fractions of American eel, bluefish, striped bass, summer flounder, and white perch.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(c) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

For the RME scenario, the cumulative total potential cancer risk for the child angler/sportsman who consumes a mixed fish diet or a crab muscle and hepatopancreas diet is approximately 3×10^{-4} for both TEQ approaches, which exceeds the NCP risk range. The primary contributors to these exceedances are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs, in fish and crab tissue (see Appendix H). The cumulative total potential cancer risks for the CTE scenario are within the NCP risk range.

The cumulative total potential noncancer HIs for the RME scenario are 40 for fish consumption and 30 for crab consumption, for both TEQ approaches, which exceed the noncancer goal of an HI of 1. The primary contributors to these exceedances are also 2,3,7,8-TCDD, PCB-126, and non-DL PCBs in fish and crab tissue. For the CTE scenario, the total potential noncancer HI associated with fish consumption is 3 or 4, depending on the TEQ approach, and for crab consumption is 5 for both TEQ approaches. These values also exceed the noncancer goal. The same chemicals—2,3,7,8-TCDD, PCB-126, and non-DL PCBs—are the primary contributors to these exceedances (see Appendix H).

6.3.1.2 Angler/Sportsman — Adolescent

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adolescent angler/sportsman. Values that exceed the NCP risk range of 10^{-6} to 10^{-4} or an HI of 1 are bolded.

Angler/Sportsman Adolescent (Age 7 to <19)						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.2	Baywide				
		Total without KM TEQ (b)	2E-06	1E-01	4E-07	4E-02
		Total with KM TEQ (c)	2E-06	1E-01	4E-07	4E-02
Surface Water	9.2	Baywide				
		Total without KM TEQ (b)	8E-08	3E-03	9E-09	7E-04
		Total with KM TEQ (c)	8E-08	2E-03	9E-09	7E-04
Fish Tissue	9.2	Mixed Fish Diet (a)				
		Total without KM TEQ (b)	**3E-04**	**3E+01**	1E-05	**2E+00**
		Total with KM TEQ (c)	**3E-04**	**3E+01**	1E-05	**2E+00**
Crab Tissue	9.2	Crab Muscle & Hepatopancreas				
		Total without KM TEQ (b)	**4E-04**	**2E+01**	2E-05	**3E+00**
		Total with KM TEQ (c)	**3E-04**	**2E+01**	2E-05	**3E+00**
Baywide Cumulative Total Risk/Hazard	9.2	Mixed Fish Diet (a)				
		Total without KM TEQ (b)	**3E-04**	**3E+01**	1E-05	**2E+00**
		Total with KM TEQ (c)	**3E-04**	**3E+01**	1E-05	**2E+00**
	9.2	Crab Muscle & Hepatopancreas				
		Total without KM TEQ (b)	**4E-04**	**2E+01**	2E-05	**3E+00**
		Total with KM TEQ (c)	**3E-04**	**2E+01**	2E-05	**3E+00**

(a) Mixed fish diet composed of equal fractions of American eel, bluefish, striped bass, summer flounder, and white perch.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(c) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

For the RME scenario, the cumulative total potential cancer risk for the adult angler/sportsman who consumes a mixed fish diet is approximately 3×10^{-4} for both TEQ approaches, and for a crab muscle and hepatopancreas diet, is approximately 4×10^{-4} when the TEQ is calculated manually and 3×10^{-4} when the TEQ is calculated using the KM TEQ calculator. All of these values exceed the NCP risk range. The primary contributors to these exceedances are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs, in fish and crab tissue (see Appendix H). Direct-contact exposure to accessible surface sediment and surface water contributes only a small amount to the cumulative cancer risk, with risk estimates within or below the NCP risk range. The cumulative total potential cancer risks for the CTE scenario are within the NCP risk range.

The cumulative total potential noncancer HI for the RME scenario is 30 for fish consumption and 20 for crab consumption, for both TEQ approaches, which exceed the noncancer goal of an HI of 1. The primary contributors to these exceedances are also 2,3,7,8-TCDD, PCB-126, and non-DL PCBs in fish and crab tissue. For the CTE scenario, the total potential noncancer HI associated with fish consumption is 2, and for crab consumption is 3, for both TEQ approaches. These values also exceed the noncancer goal. The same chemicals—2,3,7,8-TCDD, PCB-126, and non-DL PCBs—are the primary contributors to these exceedances (see Appendix H).

6.3.1.3 Angler/Sportsman — Adult

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adult angler/sportsman. Values that exceed the NCP risk range of 10^{-6} to 10^{-4} or an HI of 1 are bolded.

Angler/Sportsman Adult						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.1	Baywide				
		Total without KM TEQ (b)	4E-06	1E-01	7E-07	4E-02
		Total with KM TEQ (c)	4E-06	1E-01	6E-07	4E-02
Surface Water	9.1	Baywide				
		Total without KM TEQ (b)	5E-08	2E-03	6E-09	5E-04
		Total with KM TEQ (c)	5E-08	2E-03	6E-09	5E-04
Fish Tissue	9.1	Mixed Fish Diet (a)				
		Total without KM TEQ (b)	**5E-04**	**3E+01**	2E-05	**2E+00**
		Total with KM TEQ (c)	**5E-04**	**3E+01**	2E-05	**2E+00**
Crab Tissue	9.1	Crab Muscle & Hepatopancreas				
		Total without KM TEQ (b)	**6E-04**	**2E+01**	4E-05	**3E+00**
		Total with KM TEQ (c)	**6E-04**	**2E+01**	3E-05	**3E+00**
Baywide Cumulative Total Risk/Hazard	9.1	Mixed Fish Diet (a)				
		Total without KM TEQ (b)	**5E-04**	**3E+01**	2E-05	**2E+00**
		Total with KM TEQ (c)	**6E-04**	**3E+01**	2E-05	**2E+00**
	9.1	Crab Muscle & Hepatopancreas				
		Total without KM TEQ (b)	**6E-04**	**2E+01**	4E-05	**3E+00**
		Total with KM TEQ (c)	**6E-04**	**2E+01**	4E-05	**3E+00**

(a) Mixed fish diet composed of equal fractions of American eel, bluefish, striped bass, summer flounder, and white perch.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(c) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

For the RME scenario, the cumulative total potential cancer risk for the adult angler/sportsman who consumes a mixed fish diet is approximately 5×10^{-4} when the TEQ is calculated manually and 6×10^{-4} when the TEQ is calculated using the KM TEQ calculator, and for a crab muscle and hepatopancreas diet, is approximately 6×10^{-4} for both TEQ approaches. All of these values exceed the NCP risk range. The primary contributors to these exceedances are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs, in fish and crab tissue (see Appendix H). Direct-contact exposure to accessible surface sediment and surface water contributes only a small amount to the cumulative cancer risk, with risk estimates within or below the NCP risk range. The cumulative total potential cancer risks for the CTE scenario are within the NCP risk range.

The cumulative total potential noncancer HI for the RME scenario is 30 for fish consumption and 20 for crab consumption, for both TEQ approaches, which exceed the noncancer goal of an HI of 1. The primary contributors to these exceedances are also 2,3,7,8-TCDD, PCB-126, and non-DL PCBs in fish and crab tissue. For the CTE scenario, the total potential noncancer HI associated with fish consumption is 2, and for crab consumption is 3, for both TEQ approaches. These values also exceed the noncancer goal. The same chemicals—2,3,7,8-TCDD, PCB-126, and non-DL PCBs—are the primary contributors to these exceedances (see Appendix H).

6.3.1.4 Angler/Sportsman — Combined Adult/Child

As discussed in Section 6.1, a combined adult and child receptor is evaluated for purposes of estimating total cancer risks assuming that exposure occurs over the entire exposure duration for a resident. This equates to 6 years as a child and 20 years as an adult, for a total of 26 years, for the RME scenario, and 3 years as a child and 9 years as an adult, for a total of 12 years, for the CTE scenario. The following table summarizes the cumulative potential cancer risks for the combined adult/child angler/sportsman. Values that exceed the NCP risk range of 10^{-6} to 10^{-4} are bolded.

Angler/Sportsman Combined Adult/Child (Cancer only) (d)				
Media	RAGS D Table	Scenario	RME Total Risk	CTE Total Risk
Accessible Surface Sediment	9.A	Baywide		
		Total without KM TEQ (b)	4E-06	7E-07
		Total with KM TEQ (c)	4E-06	6E-07
Surface Water	9.A	Baywide		
		Total without KM TEQ (b)	5E-08	6E-09
		Total with KM TEQ (c)	5E-08	6E-09
Fish Tissue	9.A	Mixed Fish Diet (a)		
		Total without KM TEQ (b)	**8E-04**	3E-05
		Total with KM TEQ (c)	**8E-04**	3E-05
Crab Tissue	9.A	Crab Muscle & Hepatopancreas		
		Total without KM TEQ (b)	**8E-04**	5E-05
		Total with KM TEQ (c)	**8E-04**	5E-05
Baywide Cumulative Total Risk/Hazard	9.A	Mixed Fish Diet (a)		
		Total without KM TEQ (b)	**8E-04**	3E-05
		Total with KM TEQ (c)	**8E-04**	3E-05
	9.A	Crab Muscle & Hepatopancreas		
		Total without KM TEQ (b)	**8E-04**	5E-05
		Total with KM TEQ (c)	**8E-04**	5E-05

(a) Mixed fish diet composed of equal fractions of American eel, bluefish, striped bass, summer flounder, and white perch.
(b) Cumulative cancer risks where TEQ calculated manually.
(c) Cumulative cancer risks TEQ calculated using the KM TEQ calculator.
(d) Potential cancer risks in this table represent exposures for a child and adult over a 26-year period for RME and a 12-year exposure duration for CTE.

For the RME scenario, the cumulative total potential cancer risk for the combined adult/child angler/sportsman who consumes a mixed fish diet or a crab muscle and hepatopancreas diet is approximately 8×10^{-4} for both TEQ approaches, which exceeds the NCP risk range. The primary contributors to these exceedances are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs in fish and crab tissue (see Appendix H). Direct-contact exposure to accessible surface sediment and surface water by the adult angler/sportsman contributes only a small amount to the cumulative cancer risk, with risk estimates within or below the NCP risk range. The cumulative total potential cancer risks for the CTE scenario are within the NCP risk range.

6.3.2 Swimmer

Swimmers are assumed to be exposed to COPCs in accessible surface sediment and surface water via dermal contact and incidental ingestion. Three age groups were evaluated: a child (1 to <7 years), an adolescent (7 to 19 years), and an adult (>18 years). In addition, a combined adult/child receptor was evaluated for carcinogenic effects only, assuming a total exposure duration of 26 years for the RME scenario and 12 years for the CTE scenario.

Potential cancer risks and noncancer hazards associated with child, adolescent, and adult swimmer exposure to accessible surface sediment and surface water were estimated on a site-wide (or Bay-wide) basis. These values are summed to estimate cumulative cancer risks and noncancer hazards for these receptors. Cumulative sitewide cancer risks and noncancer hazards for the swimmer receptor are presented in Tables 6-1 and 6-2, respectively; results for each age group are discussed below.

6.3.2.1 Swimmer — Child

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the child swimmer. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Swimmer Child (Age 1 to <7)						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.7	Baywide				
		Total without KM TEQ (a)	1E-06	1E-01	2E-07	4E-02
		Total with KM TEQ (b)	1E-06	1E-01	2E-07	4E-02
Surface Water	9.7	Baywide				
		Total without KM TEQ (a)	2E-07	9E-03	4E-08	5E-03
		Total with KM TEQ (b)	2E-07	9E-03	4E-08	5E-03
Baywide Cumulative Total Risk/Hazard	9.7	Baywide				
		Total without KM TEQ (a)	2E-06	2E-01	2E-07	4E-02
		Total with KM TEQ (b)	2E-06	1E-01	2E-07	4E-02
(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually. (b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.						

6.3.2.2 Swimmer — Adolescent

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adolescent swimmer. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Swimmer Adolescent (Age 7 to <19)						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.6	Baywide				
		Total without KM TEQ (a)	2E-06	9E-02	3E-07	3E-02
		Total with KM TEQ (b)	2E-06	9E-02	3E-07	3E-02
Surface Water	9.6	Baywide				
		Total without KM TEQ (a)	5E-07	1E-02	1E-07	7E-03
		Total with KM TEQ (b)	5E-07	1E-02	1E-07	7E-03
Baywide Cumulative Total Risk/Hazard	9.6	Baywide				
		Total without KM TEQ (a)	3E-06	1E-01	5E-07	4E-02
		Total with KM TEQ (b)	2E-06	1E-01	4E-07	4E-02

(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

6.3.2.3 Swimmer — Adult

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adult swimmer. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Swimmer Adult						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.5	Baywide				
		Total without KM TEQ (a)	1E-06	3E-02	2E-07	1E-02
		Total with KM TEQ (b)	1E-06	3E-02	2E-07	1E-02
Surface Water	9.5	Baywide				
		Total without KM TEQ (a)	1E-07	3E-03	2E-08	2E-03
		Total with KM TEQ (b)	1E-07	3E-03	2E-08	2E-03
Baywide Cumulative Total Risk/Hazard	9.5	Baywide				
		Total without KM TEQ (a)	1E-06	3E-02	2E-07	1E-02
		Total with KM TEQ (b)	1E-06	3E-02	2E-07	1E-02

(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

6.3.2.4 Swimmer — Combined Adult/Child

The following table summarizes the cumulative potential cancer risks for the combined adult/child swimmer. The cumulative total potential cancer risks for this receptor are within or below the NCP risk range for both the RME and CTE scenarios, regardless of TEQ approach.

Swimmer Combined Adult/Child (Cancer only) (a)				
Media	RAGS D Table	Scenario	RME	CTE
			Total Risk	Total Risk
Accessible Surface Sediment	9.B	Baywide		
		Total without KM TEQ (b)	3E-06	4E-07
		Total with KM TEQ (c)	2E-06	3E-07
Surface Water	9.B	Baywide		
		Total without KM TEQ (b)	3E-07	5E-08
		Total with KM TEQ (c)	3E-07	5E-08
Baywide Cumulative Total Risk/Hazard	9.B	Mixed Fish Diet (a)		
		Total without KM TEQ (b)	3E-06	4E-07
		Total with KM TEQ (c)	3E-06	4E-07

(a) Potential cancer risks in this table represent exposures for a child and adult over a 26-year period for RME and a 12-year exposure duration for CTE.
(b) Cumulative cancer risks where TEQ is calculated manually.
(c) Cumulative cancer risks where TEQ is calculated using the KM TEQ calculator.

6.3.3 Wader

Waders are assumed to be exposed to COPCs in accessible surface sediment and surface water via dermal contact and incidental ingestion. Three age groups were evaluated: a child (1 to <7 years), an adolescent (7 to 19 years), and an adult (>18 years). In addition, a combined adult/child receptor was evaluated for carcinogenic effects only, assuming a total exposure duration of 26 years for the RME scenario and 12 years for the CTE scenario.

Potential cancer risks and noncancer hazards associated with child, adolescent, and adult wader exposure to accessible surface sediment and surface water were estimated on a site-wide (or Bay-wide) basis. These values are summed to estimate cumulative cancer risks and noncancer hazards for these receptors. Cumulative sitewide cancer risks and noncancer hazards for the wader receptor are presented in Tables 6-1 and 6-2, respectively; results for each age group are discussed below.

6.3.3.1 Wader — Child

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the child wader. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Wader
Child (Age 1 to <7)

Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.7	Baywide				
		Total without KM TEQ (a)	1E-06	1E-01	2E-07	4E-02
		Total with KM TEQ (b)	1E-06	1E-01	2E-07	4E-02
Surface Water	9.7	Baywide				
		Total without KM TEQ (a)	3E-08	1E-03	1E-08	4E-04
		Total with KM TEQ (b)	3E-08	1E-03	1E-08	4E-04
Baywide Cumulative Total Risk/Hazard	9.7	Baywide				
		Total without KM TEQ (a)	2E-06	1E-01	2E-07	4E-02
		Total with KM TEQ (b)	1E-06	1E-01	2E-07	4E-02

(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

6.3.3.2 Wader — Adolescent

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adolescent wader. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Wader Adolescent (Age 7 to <19)						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.6	Baywide				
		Total without KM TEQ (a)	2E-06	9E-02	3E-07	3E-02
		Total with KM TEQ (b)	2E-06	9E-02	3E-07	3E-02
Surface Water	9.6	Baywide				
		Total without KM TEQ (a)	7E-08	2E-03	8E-09	5E-04
		Total with KM TEQ (b)	7E-08	2E-03	7E-09	5E-04
Baywide Cumulative Total Risk/Hazard	9.6	Baywide				
		Total without KM TEQ (a)	2E-06	9E-02	4E-07	3E-02
		Total with KM TEQ (b)	2E-06	9E-02	4E-07	3E-02
(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually. (b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.						

6.3.3.3 Wader — Adult

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adult wader. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Wader Adult						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.5	Baywide				
		Total without KM TEQ (a)	1E-06	3E-02	2E-07	1E-02
		Total with KM TEQ (b)	1E-06	3E-02	2E-07	1E-02
Surface Water	9.5	Baywide				
		Total without KM TEQ (a)	1E-08	5E-04	2E-09	1E-04
		Total with KM TEQ (b)	1E-08	5E-04	2E-09	1E-04
Baywide Cumulative Total Risk/Hazard	9.5	Baywide				
		Total without KM TEQ (a)	1E-06	3E-02	2E-07	1E-02
		Total with KM TEQ (b)	1E-06	3E-02	2E-07	1E-02
(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually. (b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.						

6.3.3.4 Wader — Combined Adult/Child

The following table summarizes the cumulative potential cancer risks the combined adult/child wader. The cumulative total potential cancer risks for this receptor are within or below the NCP risk range for both the RME and CTE scenarios, regardless of TEQ approach.

Wader Combined Adult/Child (Cancer only) (a)				
Media	RAGS D Table	Scenario	RME Total Risk	CTE Total Risk
Accessible Surface Sediment	9.B	Baywide		
		Total without KM TEQ (b)	3E-06	4E-07
		Total with KM TEQ (c)	2E-06	3E-07
Surface Water	9.B	Baywide		
		Total without KM TEQ (b)	5E-08	7E-09
		Total with KM TEQ (c)	5E-08	7E-09
Baywide Cumulative Total Risk/Hazard	9.B	Mixed Fish Diet (a)		
		Total without KM TEQ (b)	3E-06	4E-07
		Total with KM TEQ (c)	3E-06	4E-07
(a) Potential cancer risks in this table represent exposures for a child and adult over a 26-year period for RME and a 12-year exposure duration for CTE. (b) Cumulative cancer risks where TEQ is calculated manually. (c) Cumulative cancer risks where TEQ is calculated using the KM TEQ calculator.				

6.3.4 Boater

Boaters are assumed to be exposed to COPCs in accessible surface sediment and surface water via dermal contact and incidental ingestion. Two age groups were evaluated: an adolescent (7 to 19 years), and an adult (>18 years). Young children (<7 years old) are not expected to participate in boating activities on the Bay; any such exposure would be rare and much less than that experienced by young children visiting the Bay specifically to wade or swim.

Potential cancer risks and noncancer hazards associated with adolescent and adult boater exposure to accessible surface sediment and surface water were estimated on a site-wide (or Bay-wide) basis. These values are summed to estimate cumulative cancer risks and noncancer hazards for these receptors. Cumulative sitewide cancer risks and noncancer hazards for the boater receptor are presented in Tables 6-1 and 6-2, respectively; results for each age group are discussed below.

6.3.4.1 Boater – Adolescent

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adolescent boater. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Boater Adolescent (Age 7 to <19)						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.6	Baywide				
		Total without KM TEQ (a)	2E-06	9E-02	3E-07	3E-02
		Total with KM TEQ (b)	2E-06	9E-02	3E-07	3E-02
Surface Water	9.6	Baywide				
		Total without KM TEQ (a)	3E-07	1E-02	8E-08	5E-03
		Total with KM TEQ (b)	3E-07	1E-02	8E-08	5E-03
Baywide Cumulative Total Risk/Hazard	9.6	Baywide				
		Total without KM TEQ (a)	2E-06	1E-01	4E-07	3E-02
		Total with KM TEQ (b)	2E-06	1E-01	4E-07	3E-02

(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

6.3.4.2 Boater — Adult

The following table summarizes the cumulative potential cancer risks and noncancer HIs for the adult boater. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Boater Adult						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.5	Baywide				
		Total without KM TEQ (a)	4E-07	1E-02	6E-08	4E-03
		Total with KM TEQ (b)	4E-07	1E-02	6E-08	4E-03
Surface Water	9.5	Baywide				
		Total without KM TEQ (a)	3E-07	9E-03	5E-08	3E-03
		Total with KM TEQ (b)	3E-07	9E-03	5E-08	3E-03
Baywide Cumulative Total Risk/Hazard	9.5	Baywide				
		Total without KM TEQ (a)	7E-07	2E-02	1E-07	7E-03
		Total with KM TEQ (b)	7E-07	2E-02	1E-07	7E-03

(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

6.3.5 Worker

Workers are assumed to be exposed to COPCs in accessible surface sediment via dermal contact and incidental ingestion, which was estimated on a site-wide (or Bay-wide) basis. Sitewide cancer risks and noncancer hazards for the worker receptor are presented in Tables 6-1 and 6-2, respectively, which are summarized in the following table. The cumulative total potential cancer risks and noncancer hazards for this receptor are within or below the NCP risk range or an HI of 1 for both the RME and CTE scenarios, regardless of TEQ approach.

Worker Adult						
Media	RAGS D Table	Scenario	RME		CTE	
			Total Risk	Total HI	Total Risk	Total HI
Accessible Surface Sediment	9.4	Baywide				
		Total without KM TEQ (a)	3E-06	8E-02	3E-07	3E-02
		Total with KM TEQ (b)	3E-06	8E-02	3E-07	3E-02

(a) Cumulative cancer risks and hazard indices where TEQ is calculated manually.
(b) Cumulative cancer risks and hazard indices where TEQ is calculated using the KM TEQ calculator.

6.3.5.1 Lead Risk Characterization

Lead was identified as a COPC in accessible surface sediment and blue crab muscle/hepatopancreas tissue. The USEPA Integrated Exposure Uptake Biokinetic (IEUBK) model was used to quantify potential exposures to lead for children younger than 7 years of age (USEPA 1994a, 1994b). This model correlates lead levels in the environment to blood lead levels (PbB) in children. The model developed by Bowers et al.

(1994) was used to quantify exposures to lead for adolescent and adult receptors. The component of this model for soil is the same as that used in the USEPA Adult Lead Methodology (ALM) spreadsheet (USEPA 2017d). Adult and fetal PbBs were predicted using receptor-specific exposure parameters. For all receptors, PbBs were compared to CDC's current reference value for lead of 5 µg/dL, which is lower than USEPA's PbB of concern of 10 µg/dL. In addition, preliminary remediation goals (PRGs) were calculated for sediment and crab tissue using the same adult and adolescent-specific exposure parameters and a target PbB of 5 µg/dL. The results of the lead risk assessment are summarized below by receptor; the complete assessment is presented in Appendix E.

6.3.5.2 Angler/Sportsman — Crab Consumption

The predicted PbBs for children <7 years of age who may be exposed to lead via crab consumption are less than 5 µg/dL for >99.9% of the population. Similarly, for adolescents and adults who are exposed to lead via crab consumption and direct exposure to accessible surface sediment, the predicted PbBs are below 5 µg/dL and crab tissue and sediment concentrations are below the calculated PRGs. These results indicate that lead in crab tissue and accessible surface sediment does not represent a hazard to an angler/sportsman.

6.3.5.3 Swimmers, Waders, and Boaters

The predicted PbBs for children <7 years of age who may be exposed to lead via direct contact with accessible surface sediment while swimming or wading are less than 5 µg/dL for >99.8% of the population. The predicted PbBs for adolescents and adults who may be exposed to lead via direct contact with accessible surface sediment while swimming, wading, or boating are below 5 µg/dL and sediment concentrations are below the calculated PRGs. These results indicate that lead in accessible surface sediment does not represent a hazard to a recreational swimmer, wader, or boater.

6.3.5.4 Workers

The predicted PbB for adult workers who may be exposed to lead via direct contact with accessible surface sediment is below 5 µg/dL and sediment concentration is below the calculated PRG. These results indicate that lead in accessible surface sediment does not represent a hazard to an adult worker.

6.3.6 Risk Characterization Summary

The key findings of the risk characterization are summarized below and, with the exception of lead, in tables that follow.

<u>Fish and Crab</u>

Potential exposure to COPCs in a mixed fish diet (composed of equal parts American eel, bluefish, striped bass, summer flounder, and white perch) or a crab muscle and hepatopancreas diet by anglers/sportsmen may pose cancer risks greater than the NCP risk range under the RME scenario; however, risks are within the range under the CTE scenario. For noncancer effects, the estimated noncancer HIs associated with consumption of a mixed fish diet or crab muscle and hepatopancreas diet are greater than the goal of an HI of one under both the RME and CTE scenarios. Assuming RME exposure levels, which by definition represent an upper bound, the potential cancer risk to the combined adult/child angler/sportsman who routinely consumes self-caught fish or crab (34.6 g/day for an adult and 11.5 g/day for a child) or crab (21 g/day for an adult and 7 g/day for a child) over a period of 26 years is 8×10^{-4} for either fish or crab ingestion, regardless of TEQ approach). For noncancer hazards, the RME HI for a child angler/sportsman, the most sensitive age group, is 40 for fish ingestion and 30 for crab ingestion, regardless of TEQ approach.

For the CTE scenario, which is based on average exposures to fish (3.9 g/day for an adult and 1.3 g/day for a child) or crab (3 g/day for an adult and 1 g/day for a child) over a period of 12 years, and which accounts for cooking loss for fish, the potential cancer risk for the combined adult/child sportsman is 3×10^{-5} for fish ingestion and 5×10^{-5} for crab ingestion, regardless of TEQ approach, which are within the NCP risk range of 10^{-6} to 10^{-4}. The CTE noncancer HIs for a child angler/sportsman is 3 or 4 for fish, depending on TEQ approach, and 5 for crab, regardless of TEQ approach. These values are approximately a factor of 10 lower than for the RME scenario, but still exceed an HI of one.

The COPCs contributing most to the overall risk/hazard from fish or crab consumption are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs, and to a lesser extent, other PCDD/Fs, DL-PCBs, inorganics (arsenic for risk, methyl mercury for hazard) and pesticides (dieldrin for risk, 4,4'-DDD for hazards). Below is a summary of percent contributions of key COPCs (see Appendix H) for the RME scenario.[5] As noted above, these values are limited to fish or crab consumption only, because any additional potential risks from exposure to accessible surface sediment or surface water are 100-fold or lower.

Fish Consumption

- Potential cancer risk (combined adult/child scenario): 2,3,7,8-TCDD contributes approximately 28% (33% for all PCDD/Fs), PCB-126 contributes approximately 31% (39% for all DL-PCBs), and non-DL PCBs contributes approximately 18%, which equate to maximum risks of 2×10^{-4} (3×10^{-4} for all PCDD/Fs), 3×10^{-4} (3×10^{-4} for all DL-PCBs), and 2×10^{-4}, respectively. Minor contributors include pesticides (approximately 6%) and inorganic arsenic (approximately 4%), which equate to maximum risks of 4×10^{-5} (maximum of 3×10^{-5} for dieldrin) and 3×10^{-5}, respectively.
- Noncancer hazard (child scenario): 2,3,7,8-TCDD contributes approximately 19% (22% for all PCDD/Fs), PCB-126 contributes approximately 21% (26% for all DL-PCBs), and non-DL PCBs contribute approximately 32%), which equates to maximum HIs of 8 (10 for all PCDD/Fs), 9 (10 for all DL-PCBs), and 10 for non-DL PCBs. Minor contributors include pesticides (approximately 9%) and

[5] Data presented for individual congeners are based on TEQs calculated manually; data presented for total PCDD/Fs and total DL-PCBs are based on TEQs calculated using the KM TEQ calculator. As discussed above and shown in multiple tables, the two approaches to TEQ estimation result in essentially the same overall risks/hazards.

inorganics (approximately 10%), which equate to maximum HIs of 4 (maximum of 2 for 4,4'-DDD) and 4 (maximum of 2 for methyl mercury), respectively.

Crab Consumption

- Potential Cancer Risk (combined adult/child scenario): 2,3,7,8-TCDD contributes approximately 52% (60% for all PCDD/Fs), PCB-126 contributes approximately 19% (23% for all DL-PCBs), and non-DL PCBs contribute approximately 9%, which equate to maximum risks of $4\times10^{-}4$ (5×10^{-4} for all PCDD/Fs), 2×10-4 (2×10^{-4} for all DL-PCBs), and 7×10-5, respectively. Minor contributors include inorganic arsenic (approximately 6%) and pesticides (approximately 3%), which equate to maximum risks of 5×10^{-5} and 2×10^{-5} (maximum of 1×10^{-5} for dieldrin), respectively.
- Noncancer hazards (child scenario): 2,3,7,8-TCDD contributes approximately 44% (51% for all PCDD/Fs), PCB-126 contributes approximately 16% (20% for all DL-PCBs), and non-DL PCBs contribute approximately 19%, which equates to maximum HIs of 20 (20 for all PCDD/Fs), 6 (7 for all DL-PCBs), and 7, respectively. Minor contributors include inorganics (approximately 6%) and pesticides (approximately 3%), which equate to maximum HIs of 2 (maximum of 2 for methyl mercury) and 1 (maximum of 0.3 for 4,4'-DDD), respectively.

As discussed in Section 7.3.3, there is considerable uncertainty in the TEFs for DL compounds, particularly for some of the DL-PCBs. Consistent with USEPA (2010a), a sensitivity analysis was conducted to illustrate the impact of the TEFs on the overall risk estimates and percent contribution of individual congeners or groups of congeners. For all congeners except 2,3,7,8-TCDD, the lower- and upper-bound TEFs were the 10^{th} and 90^{th} percentiles from *in vitro* and *in vivo* studies included in the relative effects potency (ReP) database (USEPA 2010a). The TEF for 2,3,7,8-TCDD remains constant in all scenarios. Accordingly, while the estimated risk for 2,3,7,8-TCDD remains constant, the contribution to risk can change, as can the relative contribution of all PCDD/Fs, all DL-PCBs, and all PCBs (non-DL and DL-PCBs). For example, for the combined adult/child angler/sportsman who consumes a mixed fish diet, the percent contribution for 2,3,7,8-TCDD increases from 28% to 44% when using the lower-bound TEFs, but decreases to only 1% when using the upper-bound TEFs. Conversely, the percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 37% when using lower-bound TEFs to 98% when upper-bound TEFs are used. Similarly, for crab muscle and hepatopancreas consumption, the percent contribution of 2,3,7,8-TCDD increases from 52% to 70% when using the lower-bound TEFs, but decreases to approximately 2% when using the upper-bound TEFs. The percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 16% when using lower-bound TEFs to 96% when upper-bound TEFs are used (see Section 7.3.3).

Sediment and Surface Water

The estimated cancer risks associated with potential exposure to COPCs in accessible surface sediment and surface water while angling, swimming, wading, or boating are within or below the NCP risk range of 10^{-6} to 10^{-4} (maximum risk of 4×10^{-6} for combined adult/child angler/sportsman). Similarly, the estimated noncancer HIs are below 1 (maximum HI of 0.1 for adolescent and adult angler/sportsman, child swimmer, and child wader).

Lead

No adverse health effects are expected to be associated with exposure to lead in crab tissue, or accessible surface sediment for any NBSA receptors.

Receptor Population	Age Group	Summary of Receptor/Exposure Pathway Cancer Risks for NBSA Baseline Human Health Risk Assessment (a) Reasonable Maximum Exposure (RME)			
		Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		3E-04	3E-04
	Adolescent	2E-06	8E-08	3E-04	3E-04
	Adult	4E-06	5E-08	5E-04	6E-04
	Adult/Child (c)	4E-06	5E-08	8E-04	8E-04
Swimmer	Child	1E-06	2E-07	*Pathways Incomplete*	
	Adolescent	2E-06	5E-07		
	Adult	1E-06	1E-07		
	Adult/Child (c)	2E-06	3E-07		
Wader	Child	1E-06	3E-08		
	Adolescent	2E-06	7E-08		
	Adult	1E-06	1E-08		
	Adult/Child (c)	2E-06	5E-08		
Boater	Child	*Pathways Incomplete*			
	Adolescent	2E-06	3E-07		
	Adult	4E-07	3E-07		
	Adult/Child (c)	*Not Applicable*			
Worker	Adult	3E-06	*Not quantified (d)*		

Notes:
Shading indicates that the cumulative potential carcinogenic risk exceeds 10-4.

(a) Cumulative cancer risks differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented represent the results based on the KM TEQ calculator.

(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.

(c) Cancer risks for adult and child age groups summed to yield 26-year total exposure duration.

(d) Workers are not expected to have contact with surface water during outdoor activities.

Receptor Population	Age Group	Summary of Receptor/Exposure Pathway Cancer Risks for NBSA Baseline Human Health Risk Assessment (a) Central Tendency Exposure (CTE)			
		Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		9E-06	2E-05
	Adolescent	4E-07	9E-09	1E-05	2E-05
	Adult	6E-07	6E-09	2E-05	3E-05
	Adult/Child (c)	6E-07	6E-09	3E-05	5E-05
Swimmer	Child	2E-07	4E-08	*Pathways Incomplete*	
	Adolescent	3E-07	1E-07		
	Adult	2E-07	2E-08		
	Adult/Child (c)	3E-07	5E-08		
Wader	Child	2E-07	1E-08		
	Adolescent	3E-07	7E-09		
	Adult	2E-07	2E-09		
	Adult/Child (c)	3E-07	7E-09		
Boater	Child	*Pathways Incomplete*			
	Adolescent	3E-07	8E-08		
	Adult	6E-08	5E-08		
	Adult/Child (c)	*Not Applicable*			
Worker	Adult	3E-07	*Not quantified (d)*		

Notes:

Shading indicates that the cumulative potential carcinogenic risk exceeds 10-4.

(a) Cumulative cancer risks differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented represent the results based on the KM TEQ calculator.

(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch

(c) Cancer risks for adult and child age groups summed to yield 12-year total exposure duration.

(d) Workers are not expected to have contact with surface water during outdoor activities.

Receptor Population	Age Group	Summary of Receptor/Exposure Pathway Noncancer Hazards for NBSA Baseline Human Health Risk Assessment (a) Reasonable Maximum Exposure (RME)			
		Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		4E+01	3E+01
	Adolescent	1E-01	2E-03	3E+01	2E+01
	Adult	1E-01	2E-03	3E+01	2E+01
Swimmer	Child	1E-01	9E-03	*Pathways Incomplete*	
	Adolescent	9E-02	1E-02		
	Adult	3E-02	3E-03		
Wader	Child	1E-01	1E-03		
	Adolescent	9E-02	2E-03		
	Adult	3E-02	5E-04		
Boater	Child	*Pathways Incomplete*			
	Adolescent	9E-02	1E-02		
	Adult	1E-02	9E-03		
Worker	Adult	8E-02	*Not quantified (c)*		

Notes:

Total hazard index presented. Shading indicates that one or more target organ-specific hazard indices exceed one.

(a) Cumulative noncancer hazards differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented represent the results based on the KM TEQ calculator.

(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.

(c) Workers are not expected to have contact with surface water during outdoor activities.

Receptor Population	Age Group	Summary of Receptor/Exposure Pathway Noncancer Hazards for NBSA Baseline Human Health Risk Assessment (a) Central Tendency Exposure (CTE)			
		Accessible Surface Sediment	Surface Water	Mixed Fish Diet (b)	Crab Muscle & Hepatopancreas
Angler/Sportsman	Child	*Pathways Incomplete*		4E+00	5E+00
	Adolescent	4E-02	7E-04	2E+00	3E+00
	Adult	4E-02	5E-04	2E+00	3E+00
Swimmer	Child	4E-02	5E-03	*Pathways Incomplete*	
	Adolescent	3E-02	7E-03		
	Adult	1E-02	2E-03		
Wader	Child	4E-02	4E-04		
	Adolescent	3E-02	5E-04		
	Adult	1E-02	1E-04		
Boater	Child	*Pathways Incomplete*			
	Adolescent	3E-02	5E-03		
	Adult	4E-03	3E-03		
Worker	Adult	3E-02	*Not quantified (c)*		

Notes:
Total hazard index presented. Shading indicates that one or more target organ-specific hazard indices exceed one.

(a) Cumulative noncancer hazards differ only minimally based on the method for estimating toxicity equivalency (TEQ) concentration (Kaplan-Meier [KM] TEQ calculator vs. manual calculations); therefore, the results presented represent the results based on the KM TEQ calculator.

(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.

(c) Workers are not expected to have contact with surface water during outdoor activities.

6.4 Potential COC Identification

Potential COCs are identified for those scenarios where the estimated total potential cumulative cancer risk exceeds 10^{-4} or the noncancer HI exceeds one. It is important to note that potential COCs are identified for all media associated with a receptor population, even if the media-specific cancer risks or noncancer HIs do not exceed these criteria. For example, as discussed in Section 6.3.1.4, the estimated cumulative cancer risk for the combined adult/child angler/sportsman is greater than 10^{-4} based almost entirely on fish ingestion, with estimated risks associated with direct contact with sediment and surface water well within the risk range. Nevertheless, potential COCs are identified for all media.

Potential COCs are identified according to the following rules:

- When the receptor-specific estimated total potential cumulative cancer risk exceeds 10^{-4}, any chemical with an exposure pathway-specific risk greater than 10^{-6} is a potential COC.
- When the receptor-specific estimated total potential cumulative target-organ-specific HI exceeds one, any chemicals with an exposure-pathway-specific, target-organ-specific HI greater than 0.1 is a potential COC.

Based on these rules, potential COCs are identified for fish and crab consumption and direct contact with accessible surface sediment, and these potential COCs are shown in the cumulative risk/hazard tables in RAGS Part D Table 10 format presented in Appendix I. Summary tables showing potential COCs for each receptor, age group, and scenario are provided in Tables 6-7 and 6-8, with chemicals divided into the following categories:

Cancer risks

- $>10^{-4}$
- $>10^{-5}$ and $\leq 10^{-4}$
- $>10^{-6}$ and $\leq 10^{-5}$

Noncancer HIs

- >1
- >0.1 and ≤ 1

As discussed previously. risk and hazard estimates for dioxin-like compounds are presented based on two approaches to calculating the TEQ, which are designated "Total PCDD/Fs (based on KM TEQ)" and "Total DL-PCBs (based on KM TEQ)" or "Total PCDD/Fs (excluding KM TEQ)" and Total DL-PCBs (excluding KM TEQ). Potential COCs could include individual congeners or Total PCDD/Fs and/or Total DL-PCBs, regardless of TEQ approach.

The primary chemicals/chemical groups driving the estimated total potential cumulative cancer risk and noncancer HI are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs. For consumption of a mixed fish diet under the RME scenario, these chemicals collectively constitute approximately 78% of the total risk and approximately 73% of the total noncancer hazard for the RME angler/sportsman scenario. Total PCDD/Fs and Total DL-PCBs make up approximately 70% to 71% of the total potential cumulative cancer risk and 46% to 47% of the total noncancer hazard, depending on TEQ approach. For consumption of a crab muscle and hepatopancreas diet, 2,3,7,8-TCDD, PCB-126, and non-DL PCBs make up approximately 79% of both the total risk and hazard, with Total PCDD/Fs and Total DL-PCB constituting approximately 83% of the total potential cumulative cancer risk and 71% of the total noncancer hazard, regardless of TEQ approach.

Other than DL compounds and non-DL PCBs, various pesticides, inorganic arsenic, and methyl mercury contribute a few percent (6% or less) to the total cumulative cancer risk or noncancer hazard, although of these compounds, only methyl mercury and 4,4'-DDD were identified as potential COCs for the CTE scenario.

Potential COCs are summarized in Table 6-9 for both RME and CTE scenarios; potential COCs for the RME scenario are summarized by the medium and cancer risk/noncancer hazard range below.

Identification of Potential Chemicals of Concern Based on RME Scenario (a)				
Chemicals with Cancer Risk $>10^{-4}$	Chemicals with Cancer Risk $>10^{-5}$ and $\leq10^{-4}$	Chemicals with Cancer Risk $>10^{-6}$ and $\leq10^{-5}$	Chemicals with Target Organ Effect HI>1	Chemicals with Target Organ Effect HI>0.1 and ≤1
RME Mixed Fish Diet				
2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,6,7,8-HxCDD	2,3,7,8-TCDD	1,2,3,7,8-PeCDD
PCB-126	2,3,4,7,8-PeCDF	2,3,7,8-TCDF	PCB-126	2,3,7,8-TCDF
Total Non-DL PCBs	PCB-118	1,2,3,7,8-PeCDF	Total Non-DL PCBs	2,3,4,7,8-PeCDF
Total PCDD/Fs (excluding KM TEQ)	Dieldrin	1,2,3,4,7,8-HxCDF	4,4'-DDD	1,2,3,4,7,8-HxCDF
Total PCDD/Fs (based on KM TEQ)	Arsenic, inorganic	1,2,3,6,7,8-HxCDF	Methyl Mercury	PCB-105
Total DL-PCBs (excluding KM TEQ)		PCB-77	Total PCDD/Fs (excluding KM TEQ)	PCB-118
Total DL-PCBs (based on KM TEQ)		PCB-105	Total PCDD/Fs (based on KM TEQ)	PCB-169
		PCB-156/157	Total DL-PCBs (excluding KM TEQ)	2,4'-DDD
		PCB-167	Total DL-PCBs (based on KM TEQ)	4,4'-DDE
		PCB-169		Dieldrin
		Benzo(a)pyrene		Nonachlor, trans-
		Dibenz(a,h)anthracene		Pyridine
		4,4'-DDD		Arsenic, inorganic
		4,4'-DDE		Cobalt
		Chlordane, alpha (cis)		Mercury
		Heptachlor epoxide, cis-		
Crab Muscle & Hepatopancreas				
2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF	2,3,7,8-TCDD	1,2,3,7,8-PeCDD
PCB-126	2,3,7,8-TCDF	1,2,3,4,7,8-HxCDF	PCB-126	2,3,7,8-TCDF
Total PCDD/Fs (excluding KM TEQ)	2,3,4,7,8-PeCDF	1,2,3,6,7,8-HxCDF	Total Non-DL PCBs	2,3,4,7,8-PeCDF
Total PCDD/Fs (based on KM TEQ)	PCB-118	PCB-77	Total PCDD/Fs (excluding KM TEQ)	1,2,3,4,7,8-HxCDF
Total DL-PCBs (excluding KM TEQ)	Total Non-DL PCBs	PCB-105	Total PCDD/Fs (based on KM TEQ)	PCB-77
Total DL-PCBs (based on KM TEQ)	Dieldrin	PCB-156/157	Total DL-PCBs (excluding KM TEQ)	PCB-105
	Arsenic, inorganic	PCB-169	Total DL-PCBs (based on KM TEQ)	PCB-118
		4,4'-DDE		PCB-169
		Heptachlor epoxide, cis-		4,4'-DDD
		Heptachlor epoxide, trans-		4,4'-DDE
				Heptachlor epoxide, cis-
				Nonachlor, trans-
				Pyridine
				Arsenic, inorganic
				Cadmium
				Cobalt
				Copper
				Mercury
				Methyl Mercury

Identification of Potential Chemicals of Concern Based on RME Scenario (a)				
Accessible Surface Sediment				
None	None	Arsenic, inorganic	None	None
Surface Water				
None	None	None	None	None

(a) The potential COCs for cancer risk are based on combined adult/child angler/sportsman receptor. The potential COCs for noncancer hazard are based on child angler/sportsman receptor.

7. Uncertainty Evaluation

The risk assessment process requires assumptions to be made about conceptual models and quantitative factors that affect the resulting risk characterization. These assumptions are made in the presence of variability (e.g., different body weights) and uncertainty (e.g., imperfect knowledge about toxicity). Evaluating the variability and uncertainty inherent to the BHHRA provides (1) confidence that the BHHRA overestimates rather than underestimates actual risks, (2) increased transparency and understanding of assumptions used, and (3) information about the reliability of the results for risk management decision making.

According to USEPA (https://www.epa.gov/expobox/uncertainty-and-variability):

> Variability *refers to the inherent heterogeneity or diversity of data in an assessment. It is a quantitative description of the range or spread of a set of values and is often expressed through statistical metrics such as variance, standard deviation, and interquartile ranges that reflect the variability of the data.*
>
> Uncertainty *refers to a lack of data or an incomplete understanding of the context of the risk assessment decision. It can be either qualitative or quantitative.*

Qualitative uncertainty may be due to a lack of knowledge about the factors that affect risk, whereas quantitative uncertainty may come from non-precise measurement methods or limited available studies.

Variability cannot be reduced, but it is addressed in deterministic risk assessments by using a combination of assumed values for variable parameters that estimates “average” exposure (i.e., CTE) and “high-end” exposure (i.e., RME). Uncertainty can be reduced with more study and data, but scientific, economic, and time constraints can limit the level of reduction that is practically feasible.

The following sections present an evaluation of variability and uncertainty inherent to the BHHRA. Section 7.1 addresses variability and uncertainty in data evaluation and potential COC selection, Section 7.2 addresses variability and uncertainty in exposure assessment, Section 7.3 addresses variability and uncertainty in toxicity assessment, and Section 7.4 addresses variability and uncertainty in risk characterization.

7.1 Data Evaluation and Potential COC Selection

7.1.1 Adequacy and Quality of Analytical Data

The physical, chemical, and biological data collected as part of the RI/FS programs conducted for the NBSA (sediment and biota) and LPRSA (surface water) between 2011 and 2014 serve as the foundation of the BHHRA. These data were collected according to USEPA Region 2–approved sampling plans and QAPPs developed based on an evolving conceptual model for the site, including site conditions and the fate and transport characteristics of chemicals found in the NBSA. The CSM was refined as new information became available, which served to guide subsequent sampling programs. The combined chemistry and survey data (e.g., fish community) provide a high level of confidence that the environmental conditions and range of impacts within the NBSA have been sufficiently characterized for purposes of the BHHRA. As agreed with USEPA, the accessible surface sediment samples were limited to those so identified in Table 2 of the SQT QAPP (Tierra, 2015b), surface water samples were limited to those collected from six locations in the NBSA from the surface to a depth of approximately 3 feet (AECOM 2014), fish-tissue samples were from sampling programs in 2014, 2015, and 2016 (Tierra 2017), and crab tissue samples were from the Crab and Clam program (GSH 2017a). Sediment, surface water and/or tissue samples were analyzed for a wide variety of compounds, including PCDD/Fs, PCBs, PAHs, SVOCs, VOCs, pesticides, herbicides, and inorganics, although not every sample was analyzed for all chemicals. While it is possible that chemicals not included in these analytical suites may be present in environmental media at the NBSA, the comprehensive nature of the analytical program included the chemicals used by industry in the NBSA and industry in general. Accordingly, the chemicals of potential public health concern that are associated with the NBSA are included in the data set underpinning the BHHRA.

All of the laboratory results for sediment, surface water, and tissue considered for use in the BHHRA underwent formal data validation. Only a small fraction (2% in sediment, 0.3% in surface water, and 2% in biota) were determined to be invalid (R-qualified), and the remaining data were used in the BHHRA as reported, either unqualified or qualified (J- or U-qualified). Data usability worksheets in RAGS Part D format are provided in Attachments A-1 through A-4 to Appendix A, which summarize the results of the data validation process and provide a brief summary of the analysis and conclusions. Additional information can be found in specific field data reports. While inclusion of J-qualified data adds some uncertainty, because the true concentration is unknown, the use of these data in the BHHRA is consistent with USEPA (1989) guidance.

7.1.2 Adequacy of the Potential COC Selection Process

The COPC screening process is intended to identify the chemicals that require further evaluation in the BHHRA, because they can potentially cause adverse health effects in humans exposed at the site. As discussed in Section 3.3, COPCs were identified through (1) identification of compounds classified by USEPA as a known human carcinogen, (2) evaluation of detection frequency, (3) identification of essential nutrients, and (4) comparison of the maximum concentration to risk-based screening values. A summary of the screening process is provided in Figure 3-7.

Chemicals identified as COPCs in the BHHRA met a minimum detection frequency requirement of 5%, and also had a maximum concentration in the exposure media that exceeded its risk-based toxicity screening level. All known human carcinogens (as classified by NTP [2016]) were retained in the quantitative risk assessment as COPCs as long as they met the minimum detection frequency requirement of 5%, and regardless of reported concentrations in the exposure media. Other chemicals were flagged in the COPC process as requiring a qualitative evaluation of uncertainty, but were excluded from the quantitative risk evaluation, for any of the following reasons:

1. The chemical was not detected in any of the samples and was classified by USEPA as a known human carcinogen, or the chemical was not detected and its maximum detection limit (DL) exceeded the risk-based screening level.
2. The chemical was detected in less than 5% of samples, and its maximum concentration (either detected concentration or a non-detect proxy value) exceeded the risk-based screening level.
3. A risk-based screening value could not be identified for the chemical, and a suitable surrogate could not be identified.

The uncertainty associated with excluding these chemicals from the quantitative risk assessment is discussed herein and examined in Tables B-2 and B-3 in Appendix B.

7.1.2.1 Chemicals excluded from quantitative risk assessment — Not detected

Chemicals that were not detected in a given medium were eliminated from the quantitative risk assessment and flagged for uncertainty review. If a chemical's analytical method is not sensitive enough to measure concentrations within the range of the risk-based screening level, it is possible that excluding these chemicals based on zero detection can underestimate potential risks. To address this uncertainty, detection limits for non-detected chemicals in crab, fish, sediment, and surface water were compared to their corresponding risk-based screening level. Table B-2 in Appendix B presents each of the chemicals flagged for uncertainty review, along with their minimum/maximum detect limits (DLs) and screening levels (SLs). Additionally, Table B-3 presents the unique list of chemicals across all media and identifies with an asterisk (*) if the chemical was flagged for uncertainty review in a given medium (i.e., crab, fish, sediment, or surface water). Further, if the chemical was flagged in the particular medium, the ratio between the minimum DL and SL is presented.

Of the 56 chemicals requiring uncertainty review, 44 chemicals were flagged for not being detected in one of the exposure media (see Table B-3). Two chemicals, 4-bromophenyl phenyl ether and 4-chlorophenyl phenyl ether, were not detected in any of the media and did not have risk-based screening levels. Detection levels were identical for these compounds and ranged as follows: sediment, 0.021–0.043 mg/kg; surface water, 0.94–1.1 μg/L; biota, 0.32–0.33 mg/kg. Given the lack of both toxicological reference values and detections in the various exposure media, it is assumed that these chemicals present minimal risk for exposed receptors in the NBSA.

The known human carcinogens that were not detected in one or more media include benzene, benzidine, and vinyl chloride. The detection limits and screening levels for benzene and vinyl chloride (analyzed in surface water) are within similar ranges and are not anticipated to contribute significantly to total risk.
A review of the DLs and SLs for benzidine indicates that its analytical sensitivity is not adequate in sediment and biota tissues, with its SL being three to five orders of magnitude lower than the minimum detection limits. If benzidine was actually present at a level between the DL and the SL, it may present a non-negligible risk, and overall risk may be underestimated.

For the remaining 39 chemicals, the ratio between the minimum DL and SL was reviewed. A majority of these chemicals had minimum DLs within two orders of magnitude of the screening level (i.e., minimum DL:SL ratio of less than 100). There were three exceptions:

- 1,2-dibromo-3-chloropropane
- 1,2-dibromoethane
- n-nitroso-di-n-propylamine.

Among these chemicals, 1,2-dibromo-3-chloropropane and 1,2-dibromoethane were analyzed only in surface water, and SLs are approximately three and two orders of magnitude lower than the minimum DL, respectively. Because these compounds were not detected, and the surface water risk-based screening level was based conservatively on residential exposure assumptions (as opposed to the actual risk of infrequent exposure to surface water during recreational activities), it is unlikely that the decision to exclude these chemicals will affect the results of the BHHRA. The remaining organic with greater than two orders of magnitude between the DL and SL (n-nitroso-di-n-propylamine) was flagged for biota (crab and/or fish) samples. This compound was not identified as a COPC in any other media (surface water or accessible sediment), as indicated in Table 3-13.

It should be noted that, while benzo(a)pyrene, dibenz(a,h)anthracene, and pyridine were flagged for uncertainty review, these compounds were actually evaluated quantitatively in the risk assessment, because they were selected as COPCs in one of the other biota matrices.

7.1.2.2 Chemicals excluded from quantitative risk assessment — Detected

Of the 56 chemicals requiring uncertainty review, 12 chemicals were detected in at least one exposure medium. Two of these chemicals, sulfide and titanium, did not have risk-based screening levels. Sulfides were detected in 100% of sediment samples; however, no further information was available regarding the speciation of sulfide represented in the analytical data. Titanium was not detected in four of the five fish species (i.e., it was detected with a frequency of 10% in striped bass), and detection limits ranged from 0.16 to 3.7 mg/kg in fish tissue. Additionally, titanium was detected in 74% of crab hepatopancreas samples and 22% of crab muscle samples. Titanium is a naturally occurring metal, and humans are exposed routinely through food and consumer products. The uncertainties associated with excluding sulfides and titanium are not expected to influence the overall risks estimated in the BHHRA.

The remaining compounds had low detection frequencies (between 0 and 5%), but the maximum chemical concentration (either a detected value or a non-detect proxy) exceeded its screening level:

- 1,2-diphenylhydrazine
- 1,2,4-trichlorobenzene
- 1,4-dichlorobenzene
- 2,4-dinitrotoluene
- 3,3'-dichlorobenzidine
- antimony

- benzaldehyde
- benzo(j,k)fluoranthene
- bis(2-ethylhexyl)phthalate
- cyanide.

The maximum concentrations for these chemicals that were used in the screening evaluation (to compare to their corresponding risk-based screening levels) were actually non-detect proxy values instead of detected concentrations. This is true for all of the chemicals listed above, except antimony. Additionally, none of the chemicals listed above had minimum DL/SL ratios that exceeded two orders of magnitude, suggesting that the analytical detection capability was sufficient for these chemicals in the various media. Given the low detection frequency and detection limits within two orders of magnitude of the screening level, it is unlikely that the decision to exclude these chemicals will affect the results of the BHHRA.

It should be noted that benzaldehyde was flagged for uncertainty due to not being detected in any of the five species of fish, and having low detection in crab muscle tissue, while having a maximum concentration that exceeded an SL. However, benzaldehyde was identified as a COPC for crab hepatopancreas tissue and consequently was included in the quantitative risk assessment for all biota tissues.

7.2 Exposure Assessment

Variability is inherent to exposure assessment, because humans vary in characteristics (e.g., body weight), behaviors (e.g., frequency of activities), and location during activities (exposure points), all of which affect their exposure.

Variability in exposure assessment is evaluated below by identifying variable parameters and quantifying their variability, explaining how a combination of assumed values for variable parameters estimates “average” exposure (i.e., CTE) and “high-end” exposure (i.e., RME), and analyzing the sensitivity of the BHHRA to variability in exposure estimation parameters.

Uncertainty in exposure assessment can be introduced by:

- Judgements, such as deciding to exclude pathways as likely to be incomplete or insignificant or to exclude receptor populations as being absent or not significantly exposed to potential COCs associated with site media
- Assumed characteristics of receptors, such as involvement in activities and amount of skin exposed during certain activities
- Data gaps and random errors in measurement or sampling techniques used to develop exposure point concentrations
- Assumed relationships within models used for exposure assessment—for example, additivity or linearity.

Uncertainty in the exposure assessment is evaluated below by qualitative discussion that presents the sources of uncertainty, identifies data gaps, explains any subjective decisions or instances where professional judgment was used, and discusses the likely impact of uncertainties regarding under- or over-estimation of risk.

7.2.1 Exposure Pathway and Receptor Selection

As discussed in Section 4.1, some exposure pathways and receptors are not included in the quantitative estimation of risks. These include inhalation of volatile and semivolatile organic potential COCs in sediment and surface water, ingestion of waterfowl or species other than fish and crabs, residential receptors, and transient receptors. Note that the inhalation pathways are given quantitative analysis, as described in the paragraph below, but are not added into the final cumulative risks of the BHHRA.

In Appendix C-1, a screening assessment for the inhalation of volatile and semivolatile potential COCs from exposed NBSA sediments was conducted to determine whether this route of exposure should be included in the BHHRA. Calculated screening levels were compared to upper-bound Newark Bay sediment concentrations to determine whether potentially elevated carcinogenic risk and noncarcinogenic hazards are present. Based on these results, the sediment volatilization pathway was excluded from the BHHRA. Similarly, in Appendix C-2, the potential for exposure to volatile or semivolatile organic potential COCs in surface water via inhalation of vapors in ambient air was evaluated. As shown in the appendix, the estimated annual average air concentrations for all ten potential COCs were below their respective residential air RSLs, by at least an order of magnitude. Accordingly, the surface water volatilization pathway was not included in the quantitative risk assessment. These screening calculations demonstrate that exclusion of these potentially complete inhalation pathways will not result in significant underestimation of exposures and risks in the BHHRA.

Exposure by ingestion of waterfowl or species other than fish and crabs (e.g., turtles, frogs) is not included in the quantitative risk assessment calculations. The New Jersey Division of Fish and Wildlife, Bureau of Law Enforcement has not observed anyone hunting in the NBSA (USEPA 2017a). Ingestion of waterfowl and animals other than fish/crabs at the NBSA appears to be minimal, especially relative to fish and crab consumption. Ducks are fattier than fish, and crabs and may carry a higher burden of PCBs/TCDD in their tissue. However, the types of waterfowl observed in the NBSA consume grass, not fish, which results in lower tissue concentrations. While there is anecdotal evidence of catching and eating turtles (AECOM 2017), it is improbable that BHHRA risks are underestimated by not including consumption of species other than fish and crab, because the likely frequency and amount of consumption is significantly lower than for fish and crab.

Residential receptors are not included as an exposed population in the quantitative risk assessment calculations. The Newark Bay shoreline does not appear to support residential land use, because, although there are residences near the Bay, access to the Bay from the residential properties is limited by physical barriers such as steep slopes and rocks. Limited residential areas were observed along the eastern shore of the Bay; these areas have either man-made or natural barriers to impede human access to the Bay. Surface water from the Bay is not used as a domestic water supply, although it is possible that residents could contact surface water during activities near their homes. It is also expected that the contribution from such exposures would be insignificant compared to the recreational pathway exposures included in the BHHRA.

As such, excluding residential use exposures will not affect confidence that the estimates from the quantitative BHHRA are RME.

Transient persons are also not included as an exposed population in the quantitative risk assessment calculations. Although transients have been observed in temporary makeshift shelters near the Passaic River (Proctor et al. 2002), information sources reviewed do not indicate that a significant transient population inhabits the NBSA shoreline. As discussed in the Problem Formulation (Tierra 2013), internet searches, peer-reviewed literature, public studies, and long-term community plans were reviewed to assess the potential presence of transient populations. While there are occasional descriptions of transient individuals in the area, the information sources reviewed do not indicate that a significant transient population inhabits the NBSA shoreline. Given this evidence, not including a potential transient population receptor in the quantitative BHHRA is reasonable. While it is possible for there to be short-term transient receptors, the assumed exposures by long-term recreators and anglers/sportsmen (sediment, surface water, fish/crab consumption) would be much higher than those of a transient. Excluding the transient receptor will not result in underestimating exposure and risks associated with the NBSA.

7.2.2 Exposure Scenario Assumptions

Exposure scenarios in the BHHRA involve exposure—by fishing, crabbing, eating fish and crab, wading, swimming, boating, and working—to potential COCs in surface water, sediment, and fish/crab tissue. Assessing the various exposure scenarios associated with adults and children engaged in these activities requires making assumptions about the parameters affecting such exposures; for example, frequency and time in contact with media containing potential COCs, rates of ingestion, body weight, skin surface area exposed, dermal adherence, and bioavailability of the potential COC in the medium to which the person is exposed.

The exposure parameters have variability and uncertainty, because:

- Humans are different in age, gender, body, and behavior
- Characteristics and attributes of the location of exposure affect activities
- Information gaps exist with regard to chemical-specific factors such as dermal absorption fractions and oral bioavailability.

One combination of assumptions evaluated is meant to be representative of RME that is above the average case but within the range of reasonably possible exposures (USEPA 1992a). Exposure parameters that are variable or uncertain are selected to be a mix of average and higher-end values within their ranges, avoiding the unrealistically high exposure estimate that would result from using all upper-bound or maximum values. Another combination is meant to be representative of CTE that is the average level of exposure predicted for the receptors (USEPA 1992a). This estimate is developed by assuming average or central tendency values for most or all exposure assumptions.

A number of the values used in the BHHRA are standard default exposure parameter assumptions recommended by USEPA for Superfund site human health risk assessments (USEPA 1989, 1991b, 2004b, 2011, 2012c, 2014). These default assumptions for the RME scenarios were developed by USEPA, in many cases based on large amounts of data from the U.S. population (e.g., body weight and body part skin surface area), to be used in combination to represent a person (within certain age groups) experiencing the upper range of possible exposures. Use of these national default values accounts for variability and contributes little if any uncertainty to RME exposure estimates in the BHHRA.

For some parameters in the BHHRA, adjustments to the USEPA default values are made to account for differences in applicable media (e.g., soil versus sediment), activity (e.g., wading versus reed-gathering), or CTE estimation. Finally, some exposure parameters are based on site-specific or chemical-specific information. The effects of these assumptions on uncertainty about exposure estimates calculated in the BHHRA are discussed in the following subsections.

7.2.2.1 Sediment and Surface Water Exposures

Sediment and surface water exposures at the NBSA are associated with recreational uses of the Bay. A number of attributes of the NBSA make it a less than desirable place to visit for recreational purposes. These include access limitations from the shoreline types (i.e., bulkhead, bridges, sheet piling, and mudflats), poor water quality, limited abundance of target species for anglers, fish and crab consumption advisories and bans, urban/industrial/commercial setting, and limited availability of boat launches and beaches. Also, exposure frequencies for swimming are from estimates developed based on swimming pools, which are likely to be higher than for swimming in the Bay. In addition, all of the receptor's body surface area is assumed to be exposed to surface water for the entire exposure. This is unlikely, even for swimming, because exposure is probably more intermittent. Furthermore, exposure assumptions for the adolescent boater were developed for the LPRSA (AECOM 2017) and are based on assumed involvement in organized rowing. It is expected that such rowing is unlikely to occur in Newark Bay; therefore, these assumed values overestimate exposure frequency for the adolescent boating scenario at the NBSA.

For all of these reasons, the use of default assumptions for RME exposure frequencies in the BHHRA leads to overestimation of potential exposure to surface water and sediment by NBSA recreators. Even with these conservative assumptions, the risks estimated by the BHHRA from exposure to surface water and sediment during swimming, wading, boating, and angling are minor contributors to total risks (see Section 6).

<u>Sediment Ingestion Rate</u>

The sediment ingestion rates assumed (50 mg/day for adults and adolescents and 100 mg/day for children) in the RME scenarios are 50% of the USEPA default values for soil ingestion. It is expected that some level of sediment removal by surface water will result in less hand-to-mouth loading than is the case with soil ingestion. Also, the USEPA soil ingestion rates represent the total daily intake of soil integrated over a variety of activities and sources, both indoors and outdoors (home, work, school, etc.). Furthermore, results of more recent studies (Stanek et al. 1997, 1999, Stanek and Calabrese 2000) have been published by the same investigators as the original studies upon which USEPA's default soil ingestion rates are based. The more recent studies incorporate improvements in study design and analysis and address some of the issues and uncertainties associated with the earlier studies. These studies suggest that upper-bound estimates of long-term soil ingestion for children and adults are approximately half of the older estimates (or 100 and 50 mg/day, respectively), and central tendency estimates are approximately one fifth of the older CTE values (or 20 and 10 mg/day, respectively). Therefore, while there is uncertainty about the soil ingestion rates that best represent sediment ingestion at the NBSA, the rates assumed are likely to represent high-end estimates and not underestimate corresponding exposures and risks.

Sediment-on-Skin Adherence Factor

The Exposure Factors Handbook (USEPA 2011) recommends soil/sediment adherence factors for adolescents and children based on a study of children engaged in shoreline play on tidal flats. However, review of the original study upon which this USEPA recommendation is based (Shoaf et al. 2005) revealed that the sediment in the study had a larger grain size than is typically found in the sediment associated with the NBSA. The adherence of sandy sediment, as characterized in the Shoaf et al. (2005) study, may be less than adherence of finer-grain sediment. The activity and conditions that most reasonably compare with child receptor activities involving exposure of skin to sediment at the NBSA, for which there are available adherence estimates (USEPA 2011), is assumed to be children playing in wet soil. These values will not underestimate adherence.

The adherence factor of 0.3 mg/cm^2 for adults is based on the geometric mean of the reed gatherer population from Exhibit 3-3 of RAGS Part E (USEPA 2004b) and is a weighted adherence factor based on hands, lower legs, forearms, and feet. This assumed adherence factor is a reasonable assumption for evaluating dermal exposure to NBSA sediment during recreational and worker activities, because these activities all involve exposure of similar body parts and movements. This assumption does not underestimate exposure or risks corresponding to this pathway and route.

Surface Water Exposure Assumptions

Exposure frequencies for RME surface water contact scenarios range from 13 to 39 days per year for the angler/sportsman, swimmer, and wader, whereas the RME exposure frequencies for the boater are 98 days per year for the adolescent and 259 days per year for the adult. Exposure times to surface water for the RME scenario are 1 hour per day for the angler/sportsman and wader, 2 hours per day for the boater, and 2.6 hours per day for the swimmer. Exposure times and frequencies for the CTE scenarios are one-half to three-quarters of the RME scenario values. There is relatively little information available regarding these types of activities; therefore, many of these assumptions are based on professional judgment and are therefore inherently uncertain. Exceptions include the exposure time for swimmers, which is based on a reported national average for swimming (USEPA 1989), and the exposure frequency for adolescent and adult boaters, which is based on assumed involvement in organized rowing to be consistent with the LPRSA BHHRA (AECOM 2017). Given the limited points of access to Newark Bay, the lack of designated swimming areas, and visible deterrents such as trash and debris, it is likely that the RME and CTE exposure assumptions overestimate exposure from swimming, and particularly for boaters, where organized rowing would not be expected to occur. Finally, the exposed skin surface area is assumed to be in contact with surface water for the entire exposure time, which is likely an overestimate for anglers/sportsmen and boaters, because surface water contact would be expected to be intermittent. Nevertheless, the estimated cancer risks and noncancer hazards associated with direct contact with surface water are well below the NCP risk range and noncancer protection goal.

7.2.2.2 Fish and Crab Consumption Exposures

The most significant pathway by which people may be exposed to chemicals in the NBSA is from consuming contaminated fish and/or shellfish. A number of attributes of the NBSA make it a less-than-desirable place to visit for recreational purposes. These include access limitations from the shoreline (i.e., bulkhead, bridges, sheet piling, and mudflats), poor water quality, limited abundance of target species for anglers, fish and crab consumption advisories and bans, and urban/industrial/commercial setting. Therefore, the use of default exposure assumptions may not best represent anglers in the NBSA. Site-specific assumptions for the following parameters have been used to assess CTE and RME risks for fish and crab: fish consumption rate, crab consumption rate, and fraction ingested from contaminated source (fish/crab). The uncertainties associated with site-specific fish and crab exposure assumptions are discussed below.

Fish consumption

Fish ingestion rates used in the BHHRA were developed by USEPA Region 2 as part of the LPRSA BHHRA (USEPA 2012a). To derive their recommended RME and CTE values for adult anglers (34.6 and 3.9 g/day, respectively), USEPA averaged the 90th and 50th percentiles reported by two surveys: an intercept survey of the Newark Bay Complex (Burger 2002) and a mail survey of licensed anglers in the State of New York (Connelly et al. 1992). Fish ingestion rates for the child and adolescent receptors were estimated, assuming rates that are one-third and two-thirds of the adult ingestion rates, respectively.

The Newark Bay 1999 angler survey (Burger 2002) intercepted anglers that fished and/or crabbed at various locations in the Newark Bay Complex, including Newark Bay, Hackensack River, Passaic River, Arthur Kill, and Kill van Kull. The survey was conducted by researchers at Rutgers University, and sites were visited randomly between May and September of 1999 throughout the day on weekdays and weekends. Survey respondents provided information on their fish and/or crab consumption behavior, reasons for angling, knowledge of advisories, and demographics. Of the 267 anglers that were interviewed in the survey, 65 responded that they only fish (i.e., they do not go crabbing) and they eat their self-caught fish.

Connelly et al. (1992) surveyed licensed anglers in the State of New York via mail. Of the 2000 mail questionnaires sent to anglers, 1030 were completed and returned. Of the non-respondents, 100 were contacted directly via phone to address non-response bias. USEPA reviewed data for the 226 survey respondents who reported consuming fish from flowing waters. Additionally, 55 of the non-respondents were included as they reported consuming at least one or more meals from their catch.

The following are uncertainties associated with the fish ingestion rate:

- *Portion Size* — The Burger (2002) survey relied on a visual model to estimate portion sizes. Subjects were provided with a 3-dimensional model of an 8-oz fillet of fish and asked to estimate their average meal portion size. This reported portion size was assumed to be the same for all meals throughout the year. USEPA's reanalysis of this data set identified four records of unusually large portion sizes of greater than 30 ounces (or greater than 2 pounds). These records were excluded from the analysis. The Connelly et al. (1992) survey only collected the number of self-caught meals consumed by the angler and did not collect data on portion size. To compute an ingestion rate, the portion size of every meal was assumed to be 8 ounces. These uncertainties may over- or under- estimate consumption.

- *Recall Bias* — Uncertainty is associated with using single recall survey events (e.g., mail surveys or creel surveys) to estimate long-term consumption rates, because it is difficult for participants to remember their activities over an entire year. When asked to recall activities over the past year, mail-recall survey respondents tend to overestimate their activities, particularly in the case of more frequent anglers (USEPA and USACE 2000). Further, conducting the creel survey during the peak fishing season (as in the case of Burger 2002), can result in an overestimation of catch throughout the year and subsequently an overestimation of consumption.
- *Response Rate* — Connelly et al. (1992) had a survey response rate of 52.3%. Low response rates typically bias consumption estimates toward higher consumers, because non-respondents usually consume less then individuals who do respond. According to Table D-1 of Connelly et al. (1992), the average number of self-caught meals reported by mail respondents was 20.4, whereas the average number of self-caught meals reported by a subset of non-respondents (later contacted via phone) was 7.6 (Connelly et al. 1992). This uncertainty can lead to an overestimation of consumption.
- *Species-specific ingestion rates* — Neither of the data sets provided insight into the particular species of fish caught and/or consumed by the angler. This information could be used in conjunction with the species-specific EPCs to better estimate potential COC intake. The BHHRA evaluated a "mixed fish" diet to account for the presence of multiple fish species in Newark Bay that may be consumed by anglers, which is assumed to comprise equal amounts (20%) of the five species collected as part of the RI/FS (American eel, bluefish, striped bass, summer flounder, and white perch). This application of a "mixed fish" diet in lieu of species-specific ingestion rates may over- or under-estimate consumption.

<u>Crab consumption</u>

USEPA Region 2 evaluated the data collected for the Burger (2002) study in the Newark Bay Complex of New Jersey to estimate crab consumption (USEPA 2012a). The Burger study reported a 50th percentile ingestion rate of 3.0 g/day and a 90th percentile ingestion rate of 20.9 g/day. As was assumed for fish, crab ingestion rates for the child and adolescent receptors were estimated assuming rates that are one-third and two-thirds of the adult ingestion rates, respectively.

Crab ingestion rates were computed for people who reported only crabbing (i.e., not fishing) and consuming self-caught crabs, resulting in a survey size of 76 respondents.

The following are uncertainties associated with the crab ingestion rate:

- Portion size — USEPA Region 2 assumed that the average edible portion of crab was 45 g/crab for all crabs ingested in the survey. Given natural variability in crab sizes and edible portions, the resulting ingestion rate may be slightly over- or under-estimated. For example, alternative citations of mean edible portions of blue crab include 40.5 g/crab for the Newark Bay Complex and 44.3 g/crab for the Arthur Kill area (Pflugh et al. 2011). Further, in calculating crab ingestion rates, two records were excluded by USEPA because they were considered outliers: one person reported eating 22 crabs per meal 25 times per month, and another person reported eating 48 crabs per meal two times per month. It is clear why the person who reported eating 22 crabs per meal 25 times per month is considered an outlier; that person represents by far the highest number of crabs eaten per month (550, with the next-highest being 182) and the highest daily ingestion rate (135.62 g/day, with the next-highest being 89.8 g/day) among the 76 records. However, it is less clear why the person who reported eating 48 crabs per meal is considered an outlier. Although this person represents the highest number of crabs eaten per meal (48, with the next-highest being 36), they represent only the fifth-highest number of crabs eaten per month (96) and the eighth-highest daily ingestion rate (23.7 g/day) among the 76 records.

- *Recall Bias* — Uncertainty is associated with using single recall survey events (e.g., mail surveys or creel surveys) to estimate long-term consumption rates, because it is difficult for participants to remember their activities over an entire year. Conducting the creel survey during peak season (as in the case of Burger 2002), can result in an overestimation of catch throughout the year and subsequently an overestimation of consumption.

Fraction ingested from contaminated source (fish/crab)

The fraction ingested parameter (FI) represents the fraction of fish and crab consumed by the receptors that is from the NBSA. Although it is possible that anglers/sportsmen catch and consume fish and crab from rivers and other water bodies in the area, the risk assessment conservatively assumes that 100% of the catch is obtained from the NBSA for both the RME and CTE scenarios. USEPA Region 2 assumed that all data reported in Burger (2002) were representative of fishing and crabbing within the Newark Bay Complex. However, it is not clear from Burger (2002) whether anglers reported all fishing or crabbing trips taken in a year (regardless of location) or just Newark Bay trips. If the angler included non-NBSA trips, then an FI assumption of 100% is an overestimate of consumption.

Crab Tissue Type Consumed

The BHHRA assumed that an angler/sportsman would consume both the muscle and hepatopancreas at every crab meal. The basis for this assumption is that some people also eat the hepatopancreas or may use the cooking water after cooking the crab with the hepatopancreas intact. However, as shown in Figure 7-1, the concentrations of PCDD/Fs, DL-PCBs, and non-DL PCBs are on the order of 20 to 40 times higher in the hepatopancreas than in the muscle tissue alone. As a result, the concentrations of these chemicals in muscle and hepatopancreas combined are 7 to 10 times higher than in muscle alone. It is important to note that angler surveys of Newark Bay and coastal New Jersey by the NJDEP indicate that the majority of crabbers remove the hepatopancreas prior to cooking or do not consume it afterward. Further, in regional surveys conducted in 1995 and 1999, including Newark Bay, Raritan Bay, and coastal New Jersey, 85% to 97% of crabbers reported consuming only crab muscle (May and Burger 1996; NJDEP 2002). Thus, assuming that anglers/sportsmen consume muscle and hepatopancreas tissue at every meal, rather than crab muscle only, as most anglers/sportsmen have been reported to do (May and Burger 1996), likely overestimates the risk to most receptors, because only a small percentage of anglers/sportsmen consumes the hepatopancreas or cooking water. The risks/hazards associated with a crab-muscle-only diet are shown in Figure 7-4. Cancer risk estimates are approximately a factor of 6 lower than for a combined muscle and hepatopancreas diet and are within the NCP risk range, even for the RME scenario. The noncancer HIs are also about a factor of 6 lower, but at approximately 4 for the RME scenario, are still higher than the noncancer protection goal of an HI of 1. The noncancer HIs for the CTE muscle-only diet are below 1. Although not shown in Figure 7-4, the risks/hazards to consumers of the crab hepatopancreas only would be much higher than the risks for consumers of muscle only or combined muscle and hepatopancreas (see Appendix F or G).

Cooking Loss

Loss of hydrophobic potential COCs from consumable animal tissue during cooking can have a significant effect on the calculated potential COC exposure dose from tissue consumption by humans. The degree of cooking loss can vary with cooking method (e.g., bake, boil, broil, fry, smoke), preparation method (e.g., trimmed/untrimmed, skin-on/skin-off), and animal species. As described in Section 4.3.6.4, the RME scenario for both fish and crab tissue consumption assumes that the consumer ingests the levels of potential COCs measured in the raw tissues prior to cooking (i.e., 0% cooking loss), based on uncertainty in cooking methods and the possibility that cooking juices are habitually consumed among some populations. As noted above, however, the assumptions that cooking never results in reduction of potential COCs from fish or crab tissue, or that the cooking juices are always consumed, are very conservative. Therefore, fish and crab consumption potential COC exposure estimates for the RME scenarios likely resulted in over-estimated cancer risks and noncancer hazards.

The CTE scenario for fish consumption included values for cooking loss ranging from 23% (for DDT) to 57% (for mirex). The CTE scenario for crab consumption assumed 0% cooking loss for all NBSA potential COCs. The following table summarizes the results of the available empirical study data on cooking losses of the bioaccumulative organics from fish that constitute the majority of the calculated health risks for the this BHHRA: PCDD/Fs, PCBs, and dieldrin.

Statistic	PCDD/Fs†	PCBs*	Dieldrin^
Median	35%	28%	30%
Mean	28%	26%	32%
Standard Deviation	31%	20%	19%
Count of Values	38	107	54
Minimum	-59%	-28%	3%
10th Percentile	-15%	-1%	8%
25th Percentile	16%	15%	16%
50th Percentile	35%	28%	30%
75th Percentile	48%	40%	43%
90th Percentile	57%	49%	55%
Maximum	100%	74%	93%

[1] Cooking methods included baking/roasting, boiling/poaching, broiling/grilling, frying (deep, pan, wok), microwaving, and smoking. Reported potential COC reduction values from non-cooking preparation methods (e.g., from trimming, dressing, canning) were excluded. See USEPA (2000), AECOM (2012b), and Rawn et al. (2013).
† Cooking loss values reported in AECOM (2012b) and Rawn et al. (2013); three values removed per outlier analysis (Leys et al. 2013).
* Cooking loss values reported in AECOM (2012b) and Rawn et al. (2013); two values removed per outlier analysis (Leys et al. 2013).
^ Cooking loss values reported USEPA (2000); two duplicate values excluded.

The studies summarized by USEPA (2000) and AECOM (2012b), as well as the data reported by Rawn et al. (2013), included a variety of fish species, including striped bass, carp, bass, catfish, perch, trout, flounder, salmon, walleye, and bluefish. Several of these species are relevant to the NBSA. A number of cooking methods were represented, including baking/roasting, boiling/poaching, broiling/grilling, variations on frying (deep, pan, wok), microwaving, and smoking. The degree of cooking loss was variable within and between studies, likely reflecting differences in cooking time, temperature, tissue preparation (skinning and trimming) and fillet geometry, lipid content, initial chemical concentration, analytical method, and extraction efficiency, all factors that are not consistently controlled for across the various studies.

Despite these inconsistencies and the inherent variability in the fish cooking loss data, the database is sufficient to support including cooking loss as a parameter in the CTE quantitative assessment of potential COC exposure dose from consumption of fish. Following USEPA's approach of differentiating cooking losses between potential COC classes (USEPA 2000), median and mean cooking loss values were computed for the PCDD/Fs, PCBs, and the pesticides recognized as NBSA potential COCs for which cooking loss data were available. The cooking loss distributions for PCDD/Fs, PCBs, and dieldrin across cooking methods are illustrated in Figure 7-2, because these potential COCs are the largest contributors to NBSA risk estimates of the potential COCs with cooking loss data. The following observations are apparent from this analysis:

- For total PCB mixtures, cooking loss ranged from -28% to 74% loss across the 15 studies (Rawn et al. 2013, and the 14 studies relevant studies evaluated in AECOM 2012b). Median losses by cooking method ranged from 11% (boil/poach) to 39% (smoke), with a median of 28% when all PCB data (excluding two outliers) are combined regardless of cooking method.
- For PCDD/Fs, cooking loss ranged from -59% to 100% across five studies (Rawn et al. 2013, and the four relevant studies evaluated in AECOM 2012b). Median losses by cooking method ranged from 16% (bake/roast) to 53% (broil/grill), with a median of 35% when all PCDD/F data (excluding three outliers) are combined regardless of cooking method.
- For dieldrin, cooking loss ranged from 3% to 93% across the relevant studies summarized by USEPA (2000). Median losses by cooking method ranged from 16% (boil/poach) to 58% (pan fry), with a median of 30% when all dieldrin data are combined regardless of cooking method.

Finally, the literature features very little empirical cooking loss data for the NBSA potential COCs and crab consumption. The default assumption that no cooking loss occurs from crab tissue for the organochlorine potential COCs likely overestimates crab consumption risks for these compounds: the limited data demonstrate an approximately 20% reduction of PCBs in boiled/steamed blue crab, and the overlap in general physicochemical properties suggests that the distribution of other organochlorine potential COCs within crab tissues in response to cooking temperatures is likely similar to that of PCBs.

7.2.2.3 Consumption of Other Fish/Crab Diets

Estimated cancer risks and noncancer hazards are presented in the BHHRA for an angler/sportsman assumed to consume a diet of self-caught fish (composed of equal portions of American eel, blue fish, striped bass, summer flounder, and white fish) or self-caught crab (muscle and hepatopancreas combined). However, it is possible that some anglers/sportsmen will have a preference for a particular fish species and will limit consumption to that single species. Cancer risks and noncancer hazards for the adult angler based on a mixed fish diet and single-species diets for the five fish species that make up the mixed fish diet are presented in Figure 7-3 for both the RME and CTE scenarios. As shown in the figure, the RME cancer risks for all diets are above 10^{-4}, ranging from approximately 2×10^{-4} (bluefish) to approximately 8×10^{-4} (striped bass), as compared to approximately 5×10^{-4} for a mixed fish diet. For the CTE scenario, all cancer risks are within the NCP risk range. The RME noncancer HIs for all diets are above the noncancer protection goal of an HI of 1, ranging from approximately 20 for blue fish to approximately 60 for American eel and striped bass, as compared to approximately 40 for a mixed fish diet. The noncancer HIs for the CTE scenario are also above 1 for all diets, but about a factor of 10 lower than those for the RME scenario.

It is also possible that some anglers/sportsmen will consume both fish and crab. According to Burger (2002), most Newark Bay anglers consumed only fish or only crab, with only approximately 12% reporting that they consumed both. Further, anglers/sportsmen who fished and crabbed reported eating fish and crab more frequently than those who did not (average of 6 times per month vs. 4 times or fewer). These data suggest that those anglers/sportsmen who consume both fish and crab from NBSA may be at a higher risk than anglers/sportsmen who consume only fish or only crab.

7.2.3 Estimation of Exposure-Point Concentrations

The EPCs are based on data assumed to be representative of site conditions. For example, the sediment samples used in the BHHRA were collected in areas that were reasonably accessible by workers or recreational users around the perimeter of the NBSA. Surface water samples were collected over multiple years and flow conditions. Samples of five fish species and two crab tissue types were collected to reflect the local fish community and angler preferences. Despite these efforts, there is uncertainty in the EPCs used to represent current (and future) conditions because of the large size of the NBSA and the temporal and spatial variability in the ecosystem.

USEPA (1989) guidance states that the 95% upper confidence limit (UCL) on the arithmetic mean concentration should be used as the EPC, because this statistic represents a reasonable upper bound on the arithmetic average concentration that is contacted over the exposure period. The 95% UCL was used as the EPC for both the RME and CTE scenarios, unless it was greater than the maximum concentration; in those few cases, the maximum concentration was used as the EPC. Accordingly, it is unlikely that the EPCs used in the BHHRA underestimate actual exposure concentrations over an extended period of time.

7.2.3.1 Uncertainty in Sediment EPCs

The accessible surface sediment data used to estimate EPCs are from 39 locations across the NBSA; field duplicate samples were collected at two locations. These data were collected as part of two sampling programs: Crab and Clam Sampling Program (16 locations) and SQT and Porewater Sampling Program (23 locations). While this is not a large number of samples given the size of the NBSA, the analytical results from the two sampling programs were reasonably similar, which adds confidence to the overall representativeness of the data. For example, for PCDD/Fs and PCBs, the concentrations between the two sampling programs are generally within a factor of two.

7.2.3.2 Uncertainty in Surface Water EPCs

The surface water data used to estimate EPCs are from six locations across the NBSA. Samples were collected over seven sampling rounds under normal and high-flow conditions. A total of 131 samples were collected in the upper 3 feet of the surface water column, which is assumed to be the depth to which recreational users would be exposed. Additional data were collected within the bottom 3 feet of the water column. Although not used to calculate EPCs, the average concentrations for near-surface samples are generally within 50% of the average concentrations for all surface samples. This consistency between the near-surface and deeper surface water concentrations adds confidence to the overall representativeness of the surface water EPCs.

7.2.3.3 Uncertainty in Tissue EPCs

The fish tissue data used in the BHHRA are from 95 fish filet samples across five species collected during 2014, 2015, and 2017. For crab tissue, the data include 37 samples each of Blue crab muscle and hepatopancreas collected in 2014. The EPC for a mixed fish diet was calculated by dividing the EPC for each species by 5, and then taking the sum. This assumes that a mixed fish diet comprises exactly equal portions of all five species, without regard to prevalence or the length of time that each species is resident in Newark Bay. The uncertainty in this assumption is addressed by estimating risks for single-species diets for comparison purposes (see Section 7.2.2.3). For crab, the BHHRA assumed that anglers/sportsman consumed both the crab muscle and hepatopancreas. Because these tissue types were analyzed separately, the concentration in crab muscle and hepatopancreas combined had to be estimated based on the relative weights of the two tissues, as measured in 34 of the 37 crabs collected. From these data, it was estimated that the crab muscle constitutes 76%, and the crab hepatopancreas 24%, of the combined tissue. While there is some uncertainty associated with this calculation, as opposed to analyzing the combined tissue, the amount of uncertainty is expected to be small.

7.2.3.4 Assumption of No Degradation

For purposes of the BHHRA, the EPCs calculated based on current site conditions are assumed to remain the same for the entire exposure duration, which is up to 26 years for the combined adult/child receptor. This is an inherently conservative assumption, because chemicals in the environment are subject to natural processes, including biodegradation and attenuation. The extent of any degradation will depend on various chemical-specific and environmental factors; however, by assuming no degradation at all over such an extended period of time, the estimated cancer risks and noncancer hazards are likely to be overestimated, at least to some degree.

7.2.3.5 Methods and Assumptions Used to Model Media Concentrations

The only exposure pathway evaluated that relied on a model was inhalation of vapors from sediment or surface water (see Appendix C-1 and C-2, respectively). In the absence of empirical data, screening-level models were used to estimate potential volatilization of VOCs and SVOCs into ambient air and subsequent dispersion to a downwind (most highly exposed) receptor. The results of these screening-level assessments indicate that inhalation of ambient air adjacent to the NBSA is not of concern, and it is unlikely that these risks have been underestimated.

7.2.4 Estimation of Exposure Dose

Dermal absorption fractions and oral bioavailability factors, where available, were used to account for differences between exposure conditions for humans vs. laboratory animals. The uncertainty in these assumptions is discussed below.

7.2.4.1 Default Dermal Absorption Fractions

As discussed in Section 4.3.10.1, default dermal absorption fractions (DAFs) were compiled from RAGS Part E (USEPA 2004b), because site-specific information was not available. These values were derived by USEPA to be conservative for most sites, but may be overly conservative, especially for lipophilic compounds such as PCDD/Fs and PCBs, at some sites with high organic carbon content. For example, USEPA (2004b) provides two DAFs for PDDD/Fs, the default value being 0.03, but an alternative value of 0.001 (30-fold lower) when the fraction of organic carbon is greater than 10%. Nevertheless, use of the default DAFs did not result in estimated cancer risks or noncancer hazards that exceeded the NCP risk range or noncancer protection goal.

7.2.4.2 Oral Bioavailability

A value of 1 (100%) was assumed for the oral relative bioavailability (RBA) factor for all COPCs in sediment except arsenic, for which a value of 0.6 (60%) was assumed, consistent with USEPA approaches (1989, 2018d). The extent to which the RBA for chemicals other than arsenic has been overestimated is unknown; however, USEPA has discussed methods for estimating the RBA of PCDD/Fs in soil, and the available studies suggest that the evidence supports a value less than 100% (USEPA 2010c). Regardless, use of 100% RBA for all COPCs other than arsenic did not result in estimated cancer risks or noncancer hazards that exceeded the NCP risk range or noncancer protection goal.

7.3 Toxicity Assessment

The purpose of the toxicity assessment is to determine the nature of adverse health effects that may occur with exposure to a certain chemical, and to identify the relationship between the dose of a chemical and the possibility and extent of a potential adverse effect (USEPA 1989). Adverse effects are divided into two categories—cancer and noncancer—where cancer effects are generally thought to occur by a linear, no-threshold mode of action (zero risk at zero dose), whereas noncancer effects are generally thought to occur by a nonlinear threshold mode of action. USEPA has developed a series of guidelines for deriving toxicity values for these two classes of compounds (e.g., USEPA 2002b, 2005b, 2012f). These methods have inherently many of the same uncertainties, given the limited understanding of the toxicity to humans exposed to substances at the low concentrations generally encountered in the environment. Accordingly, USEPA relies on conservative methods and assumptions to extrapolate from high-dose animal studies to predict the possible response in humans at exposure levels far below those administered to animals. Even in cases where human exposure data are available, these data are often from high-exposure settings, such as the workplace, that are not representative of much lower exposure levels found in the environment. Overall, uncertainty in the toxicity values used to estimate risk is often the largest source of uncertainty in the entire risk assessment.

7.3.1 Evaluation of Noncarcinogenic Dose-Response

Often, toxicity factors are based on animal studies, because human health effects data are not available for many chemicals. Seventy-six of the 84 COPCs quantitatively evaluated (this includes the individual PCDD/PCDF and DL-PCB congeners) have oral RfDs. Of these 76, 36 are based on animal data, and 40 are based on human toxicological information. (Of the 40 COPCs that are based on human studies, a large number [28] are individual PCDD/PCDF and DL-PCB congeners.) USEPA's risk assessment guidelines include the assumption that animal data are relevant for human exposures (USEPA 1989, 1991e, 2002b). As indicated above, extrapolation of animal toxicity information to humans adds uncertainty to the risk characterization step, and when human data are available, uncertainty is decreased. Further, uncertainty is increased when the mechanism and fate for a chemical are unknown; particularly if the mechanism and fate are unknown in humans.

UFs are used to estimate human responses from animal toxicity data. UFs are intended to be health protective, with toxicity factors intentionally overestimating toxicity in humans. RfDs are based on toxicity data representing the most sensitive species and the lowest dose causing a mild effect, when information is available. UFs are applied to this lowest dose level. UFs typically address the length of study, and interspecies and intraspecies variability, LOAEL-to-NOAEL extrapolation, and database uncertainty. Individual UFs range from 1 to 10; USEPA (2002b) recommends that the combined UF for a chemical not exceed 3,000. In this BHHRA, combined UFs for the COPCs are within this range (1 for manganese, up to 3,000 for cobalt, 2,4'-DDE [based on 4,4'-DDE as a surrogate], 4,4'-DDE, naphthalene, and thallium).

Adverse effects occurring in animals may not materialize in humans, due to different fate and metabolic processes between species. This could lead to an overestimation of toxicity in humans and a resulting RfD that is lower than intended. It is acknowledged that, even with these layers of protectiveness, there is the chance that an animal study will not show a toxic effect that could occur in humans. This phenomenon could potentially lead to underestimating the chemical's toxicity in humans, and a resulting RfD that is higher than would be considered adequately protective.

Of the eight COPCs that do not have oral RfDs, six are the carcinogenic PAHs other than BaP. Lead does not have an RfD but is evaluated in risk assessments using blood lead modeling (see Appendix E). Titanium uses titanium tetrachloride as a surrogate and lacks an oral RfD.

7.3.2 Evaluation of Carcinogenic Dose-Response

There is also uncertainty in estimating dose-response relationships for potential carcinogens, perhaps more so than for the noncarcinogens discussed above. The primary sources of this uncertainty include (1) selection of the underlying study, (2) conversion from animal to human dose, when necessary, and (3) mathematical model used for high-dose to low-dose extrapolation. Of the 84 chemicals/chemical groups identified as COPCs, 61 are classified as carcinogenic or potentially carcinogenic via the oral route.

7.3.2.1 Study Selection

In general, study selection involves a process of evaluating the available toxicity data to identify a data set that provides sufficient dose-response information to support derivation of a defensible CSF. When available, human epidemiology are preferred; however, in most cases, adequate human data are lacking, and it is necessary to rely on laboratory animal data instead. Ideally, the animal study is in a species that reasonably resembles humans biologically and where the administration route is the same as or similar to the expected route of human exposure. The study selection criteria, in combination, are intended to be health-protective, such that the resulting dose-response assessment is more likely to overstate, rather than understate, the potential cancer risk.

Of the chemicals identified as potential COCs, arsenic is the only one for which the oral CSF is based on human epidemiological studies, and arsenic contributes, at most, only a few percent to the total cumulative cancer risk. Except for benzo(a)pyrene, which was identified as a potential COC but contributes less than 1% to the total cumulative risk, the remaining potential COCs that are carcinogens are classified as "B2," which is defined as sufficient evidence of carcinogenicity in animals with inadequate or a lack of evidence in humans under the 1986 cancer classification scheme (USEPA 1986b). Benzo(a)pyrene is classified as "carcinogenic to humans" under the current classification scheme (USEPA 2005b), but as noted, is only a very small contributor to the total cumulative risk.

As identified in Section 5.1, a Tier-3 oral CSF was used for 2,3,7,8-TCDD, because there is no currently recommended value on IRIS, nor is there a PPRTV. This value is from USEPA's HEAST (1997a), based on a dietary study in rats, and is used as the index for the remaining PCDD/Fs and DL-PCBs, which in total, constitute the majority of the total cumulative cancer risk. The uncertainty in this value is discussed in Section 7.3.6.

The remaining potential COC that is a primary contributor to the total cumulative cancer risk is non-DL PCBs. This group of compounds has been shown to cause cancer in animals, and the CSFs for PCBs provided in IRIS are also based on a dietary study in rats (USEPA 1996b, 2018e). In addition, while IRIS considers the human carcinogenicity data for PCBs to be “inadequate, but suggestive,” the weight-of-evidence classification as of the last IRIS review in 1996 is “B2” (sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans) (USEPA 2018e). Since that time, the International Agency for Research on Cancer (IARC) has concluded that available evidence in humans is sufficient to classify PCBs as Group 1 (carcinogenic in humans (IARC 2016).

7.3.2.2 Interspecies Dose Conversion

In USEPA’s calculation of human equivalent doses from animal data, it is assumed that animals and humans have the same sensitivity to a chemical’s toxic effects—provided the mechanism of toxicity is identical and the same amount of substance per body surface area is absorbed by both animals and humans. This evaluation of the particular animal species relative to humans is extremely useful, in that it yields information regarding the shape of the dose-response curve for doses at which tumors occur, includes assessment of biomarkers of health effects, identifies levels where carcinogenic impacts are occurring, and facilitates interspecies extrapolations when data are available from both human and animal cells (USEPA 2005b). Although determination of upper bounds does not rely on susceptibility information, using upper bounds is typically regarded as a conservative, protective approach for accounting for risk to sensitive persons. However, USEPA (2005b) indicates that dose conversions between species typically yield CSFs that do not represent a risk for a highly sensitive subpopulation or individual, but are usually an upper bound on risk for a randomly selected person, or the average risk in a population.

Additional assumptions (and added uncertainties) are involved in assessment of risks based on one exposure route (e.g., ingestion) when the original study used a different exposure route (e.g., inhalation). Scaling factors are employed to handle disparities between animals and humans regarding breathing rates, body size, life span, and other physiological differences. Although updates to the older CSFs will be made when the USEPA updates toxicity values using the IRIS procedures, USEPA has altered its default recommendation for scaling animal data to humans; scaling is now recommended as a per-body-weight basis instead of a per-surface-area basis (USEPA 1992b, 2005b), Note that USEPA’s 1996 cancer assessment for PCBs (USEPA 1996b) includes an extrapolation of body weight to the three-quarters power.

7.3.2.3 High-Dose to Low-Dose Extrapolation

The concentrations tested in animal toxicity studies are generally much higher than what humans are exposed to in the environment. Accordingly, estimating health effects at these low dose levels requires the use of models to extrapolate effects observed in high-dose animal studies, which introduces uncertainty in the dose-response assessment. There are many different forms of these mathematical models, depending on the type of data being analyzed, but they are designed and applied in such a way as to more likely overstate, rather than understate, the potential cancer risk. For example, many of the CSFs provided in the IRIS database are based on the 95% UCL of the slope predicted by the linearized multistage (LMS) model, which assumes that some risk exists at any level of exposure. This value represents the plausible upper limit to the risk, consistent with some proposed carcinogenic mechanisms; however, as acknowledged by USEPA, the true risk is unknown and may be zero (USEPA 1989, 2005b). Use of these upper-bound cancer potency estimates is expected to result in conservative (i.e., health-protective) estimates of potential cancer risk.

7.3.3 Uncertainty in TEF Approach

USEPA recommends using the TEF method to assess health risks posed by mixtures of DLCs (USEPA 2010a). This method provides a means of estimating the combined toxicity of DLCs by scaling each DLC's dose according to its relative potency, and summing across all DLCs. The scaling factors recommended by USEPA are the 2005 WHO consensus TEFs (USEPA 2010a; van den Berg et al. 2006). These TEFs represent single estimates of relative potency; however, a wide range of relative potencies exists in the literature for each of the DLCs (USEPA 2010a; Haws et al. 2006). Therefore, for risk assessments, USEPA recommends conducting a sensitivity analysis to illustrate the impact of the TEFs.

USEPA recommends the following methods for evaluating lower- and upper-bound TEFs (i.e., TEF_{iU} and TEF_{iL}) (USEPA 2010a):

1. TEF_{iL} and TEF_{iU} can be defined by dividing and multiplying the WHO 2005 TEFs by half a log (i.e., 3.16), respectively.
2. TEF_{iL} and TEF_{iU} can be based on statistical summaries of ReP data. Suggested statistical summaries include the minimum/maximum, 10^{th}/90^{th} percentiles, or interquartile ranges.

In this sensitivity analysis, the 10^{th} and 90^{th} percentiles of *in vitro* and *in vivo* ReP data, shown in Table 4 of USEPA (2010a), were selected to represent TEF_{iL} and TEF_{iU}, respectively. For the coeluting congeners PCB-156 and PCB-157, the maximum of the 10^{th} and 90^{th} percentiles for either of these congeners was conservatively selected to represent TEF_{iL} and TEF_{iU} (i.e. $TEF_{PCB\text{-}156/157,L}$= 0.0001 and $TEF_{PCB\text{-}156/157,U}$= 0.2). The lower- and upper-bound TEFs used in the sensitivity analysis, as well as the default WHO 2005 TEFs, are shown in the table below. Additionally, ratios comparing the TEF_{iL} and TEF_{iU} to the WHO 2005 TEFs can be seen.

Toxic Equivalence Factors (TEFs) for Dioxin-Like Compounds					
Chemical of Potential Concern	**TEF_{iL}**	**TEF_{WHO}**	**TEF_{iU}**	**Ratio of TEF (TEF_{iL}/ TEF_{WHO})**	**Ratio of TEF (TEF_{iU}/ TEF_{WHO})**
2,3,7,8-TCDD	1	1	1	1.0	1.0
1,2,3,7,8-PeCDD	0.1	1	0.8	0.1	0.8
1,2,3,4,7,8-HxCDD	0.04	0.1	0.4	0.4	4.0
1,2,3,6,7,8-HxCDD	0.03	0.1	0.1	0.3	1.0
1,2,3,7,8,9-HxCDD	0.02	0.1	0.07	0.2	0.7
1,2,3,4,6,7,8-HpCDD	0.004	0.01	0.04	0.4	4.0
OCDD	0.0003	0.0003	0.003	1.0	10.0
2,3,7,8-TCDF	0.01	0.1	0.3	0.1	3.0
1,2,3,7,8-PeCDF	0.01	0.03	0.1	0.3	3.3
2,3,4,7,8-PeCDF	0.05	0.3	1	0.2	3.3
1,2,3,4,7,8-HxCDF	0.04	0.1	0.5	0.4	5.0
1,2,3,6,7,8-HxCDF	0.01	0.1	0.1	0.1	1.0
1,2,3,7,8,9-HxCDF	0.1	0.1	0.2	1.0	2.0
2,3,4,6,7,8-HxCDF	0.01	0.1	0.3	0.1	3.0
1,2,3,4,6,7,8-HpCDF	0.05	0.01	0.3	5.0	30.0
1,2,3,4,7,8,9-HpCDF	0.02	0.01	0.04	2.0	4.0
OCDF	0.00003	0.0003	0.002	0.1	6.7
PCB-77	0.00002	0.0001	0.1	0.2	1000.0
PCB-81	0.0006	0.0003	0.02	2.0	66.7
PCB-105	0.000005	0.00003	0.002	0.2	66.7
PCB-114	0.0002	0.00003	0.002	6.7	66.7
PCB-118	0.000002	0.00003	0.002	0.1	66.7
PCB-123	0.00001	0.00003	0.0004	0.3	13.3
PCB-126	0.01	0.1	0.4	0.1	4.0
PCB-156/157	0.0001	0.00003	0.2	3.3	6666.7
PCB-167	0.000005	0.00003	0.0004	0.2	13.3
PCB-169	0.0007	0.03	0.5	0.0	16.7
PCB-189	0.000005	0.00003	0.0001	0.2	3.3

The lower-bound TEF, TEF_{iL}, differs by a factor of 10 or more from the default WHO 2005 TEF for the following compounds:

- Decrease: 1,2,3,7,8-PeCDD, 2,3,7,8-TCDF, 1,2,3,6,7,8-HxCDF, OCDF, PCB-118, PCB-126, PCB-169
- Increase: none of the compounds increased by more than a factor of 10.

The greatest difference in TEF was noted for PCB-169, for which the default TEF is 0.03 and the TEF_{iL} is 0.0007.

The upper-bound TEF, TEF_{iU}, differs by a factor of 10 or more relative to the default WHO TEF for the following compounds:

- Decrease: none of the compounds decreased by more than a factor of 10
- Increase: OCDD, 1,2,3,4,6,7,8-HpCDF, PCB-77, PCB-81, PCB-105, PCB-114, PCB-118, PCB-123, PCB-156/157, PCB-167, PCB-169.

The greatest differences in TEF were noted for PCB-77 and PCB-156/157, which changed by factors of 1000 and 6667, respectively. These lower- and upper-bound TEFs were used to calculate excess cancer risk for angler consumption of fish and crab.

<u>TEF sensitivity analysis — Angler/sportsman consumption of a mixed fish diet</u>

RME risk from the angler/sportsman's consumption of a mixed fish diet is shown in the table below. Risks are presented for each of the individual DLCs and non-DL PCBs, as well as aggregates by chemical type (i.e., Total DLCs, Total PCDD/Fs, Total DL-PCBs, Total PCBs [dioxin-like and non-dioxin-like], and overall Total risk [from all potential COCs, not just dioxin/furans and PCBs]).

The overall risk for this pathway using the default WHO 2005 TEF values for DLCs is 8×10^{-4}. When using lower-bound estimates of TEFs for DLCs, the overall risk reduces to 5×10^{-4}. Employing upper-bound estimates of TEFs for DLCs increases the overall risk dramatically, to 2×10^{-2}. The largest difference in risk was noted for PCB-156/157, which went from 2.3×10^{-6} in the default TEF evaluation to 1.5×10^{-2} when using TEF_{iU}. Additionally, large increases in risk were noted for PCB-77 and PCB-118 for the TEF_{iU} evaluation.

Risks for 2,3,7,8-TCDD are constant across the TEF_{iL}, TEF_{WHO} (default), and TEF_{iU} evaluations (i.e., 2.2×10^{-4}), because the TEF is equal to 1 in all scenarios. However, the contribution to risk changes for 2,3,7,8-TCDD drastically, ranging from 44% of the total risk when the lower-bound TEFs are used for all DLCs, to 1% of the total risk when the upper-bound TEFs are used for all DLCs. Conversely, the percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 37% when using lower-bound TEFs to 98% when upper-bound TEFs are used.

Angler/Sportsman (Adult + Child) RME Risk from Consumption of Mixed Fish (all species) Based on Various TEFs (TEF_{iL}, TEF_{WHO}, and TEF_{iU})

Receptor	Expo Pathway	Chemical of Potential Concern	TEF_{iL}		TEF_{WHO}		TEF_{iU}	
			Risk	Contribution to Total Risk (%)	Risk	Contribution to Total Risk (%)	Risk	Contribution to Total Risk (%)
Angler Adult/Child	Mixed Fish/All Species	**Dioxin-Like Compounds**						
		2,3,7,8-TCDD	2.2E-04	44.3%	2.2E-04	28.4%	2.2E-04	1.1%
		1,2,3,7,8-PeCDD	1.2E-06	0.2%	1.2E-05	1.5%	9.6E-06	0.0%
		1,2,3,4,7,8-HxCDD	2.2E-07	0.0%	5.6E-07	0.1%	2.2E-06	0.0%
		1,2,3,6,7,8-HxCDD	5.2E-07	0.1%	1.7E-06	0.2%	1.7E-06	0.0%
		1,2,3,7,8,9-HxCDD	8.2E-08	0.0%	4.1E-07	0.1%	2.9E-07	0.0%
		1,2,3,4,6,7,8-HpCDD	7.7E-08	0.0%	1.9E-07	0.0%	7.7E-07	0.0%
		OCDD	3.4E-08	0.0%	3.4E-08	0.0%	3.4E-07	0.0%
		2,3,7,8-TCDF	4.6E-07	0.1%	4.6E-06	0.6%	1.4E-05	0.1%
		1,2,3,7,8-PeCDF	4.2E-07	0.1%	1.2E-06	0.2%	4.2E-06	0.0%
		2,3,4,7,8-PeCDF	3.3E-06	0.7%	2.0E-05	2.5%	6.6E-05	0.3%
		1,2,3,4,7,8-HxCDF	1.2E-06	0.2%	3.0E-06	0.4%	1.5E-05	0.1%
		1,2,3,6,7,8-HxCDF	2.7E-07	0.1%	2.7E-06	0.3%	2.7E-06	0.0%
		1,2,3,7,8,9-HxCDF	3.1E-07	0.1%	3.1E-07	0.0%	6.2E-07	0.0%
		2,3,4,6,7,8-HxCDF	4.6E-08	0.0%	4.6E-07	0.1%	1.4E-06	0.0%
		1,2,3,4,6,7,8-HpCDF	3.2E-06	0.6%	6.3E-07	0.1%	1.9E-05	0.1%
		1,2,3,4,7,8,9-HpCDF	5.9E-08	0.0%	2.9E-08	0.0%	1.2E-07	0.0%
		OCDF	1.9E-10	0.0%	1.9E-09	0.0%	1.2E-08	0.0%
		PCB-77	2.7E-07	0.1%	1.3E-06	0.2%	1.3E-03	6.5%
		PCB-81	3.1E-07	0.1%	1.6E-07	0.0%	1.0E-05	0.1%
		PCB-105	1.0E-06	0.2%	6.2E-06	0.8%	4.1E-04	2.0%
		PCB-114	3.2E-06	0.6%	4.8E-07	0.1%	3.2E-05	0.2%
		PCB-118	1.7E-06	0.3%	2.5E-05	3.2%	1.7E-03	8.2%
		PCB-123	1.5E-07	0.0%	4.6E-07	0.1%	6.1E-06	0.0%
		PCB-126	2.5E-05	4.8%	2.5E-04	31.1%	9.8E-04	4.8%
		PCB-156/157	7.7E-06	1.5%	2.3E-06	0.3%	1.5E-02	75.0%
		PCB-167	1.7E-07	0.0%	1.0E-06	0.1%	1.3E-05	0.1%
		PCB-169	7.2E-08	0.0%	3.1E-06	0.4%	5.2E-05	0.3%
		PCB-189	3.1E-08	0.0%	1.8E-07	0.0%	6.1E-07	0.0%
		Non-DL PCBs						

Angler/Sportsman (Adult + Child) RME Risk from Consumption of Mixed Fish (all species) Based on Various TEFs (TEF_{iL}, TEF_{WHO}, and TEF_{iU})								
Receptor	Expo Pathway	Chemical of Potential Concern	TEF_{iL}		TEF_{WHO}		TEF_{iU}	
			Risk	Contribution to Total Risk (%)	Risk	Contribution to Total Risk (%)	Risk	Contribution to Total Risk (%)
		Total Non-DL PCBs	1.5E-04	29.3%	1.5E-04	18.8%	1.5E-04	0.7%
		Total DLCs	3E-04	54.3%	6E-04	70.7%	2E-02	98.9%
		Total PCDD/Fs	2E-04	46.6%	3E-04	34.5%	4E-04	1.8%
		Total DL-PCBs	4E-05	7.7%	3E-04	36.2%	2E-02	97.1%
		Total PCBs (DL & NDL)	2E-04	37.0%	4E-04	55.0%	2E-02	97.8%
		TOTAL - All potential COCs	5E-04	100.0%	8E-04	100.0%	2E-02	100.0%

TEF sensitivity analysis — Angler/sportsman consumption of crab muscle and hepatopancreas

RME risk from the angler/sportsman's consumption of crab muscle and hepatopancreas is shown in the table below. Risks are presented for each of the individual DLCs and non-DL PCBs, as well as aggregates by chemical type (i.e., Total DLCs, Total PCDD/Fs, Total DL-PCBs, Total PCBs [dioxin-like and non-dioxin-like], and overall Total risk [from all potential COCs, not just dioxin/furans and PCBs]).

The results of RME risk for the crab muscle and hepatopancreas consumption are similar to the RME risk for a mixed fish diet. Overall risk for this pathway using default WHO 2005 TEF values for DLCs is 8×10^{-4}. When using lower-bound estimates of TEFs for DLCs, the overall risk reduces to 6×10^{-4}. Employing upper-bound estimates of TEFs for DLCs increases the overall risk dramatically, to 2×10^{-2}. The largest difference in risk was noted for PCB-156/157, which went from 1.8×10^{-6} in the default TEF evaluation to 1.2×10^{-2} when using TEF_{iU}.

Risks for 2,3,7,8-TCDD are constant across the TEF_{iL}, TEF_{WHO} (default), and TEF_{iU} evaluations (i.e., 4.3×10^{-4}), because the TEF is equal to 1 in all scenarios. However, the contribution to risk changes drastically for 2,3,7,8-TCDD, ranging from 70% of the total risk when the lower-bound TEFs are used for all DLCs, to 2% of the total risk when the upper-bound TEFs are used for all DLCs. Contribution to risk for Total PCDD/Fs decreases from 73% to 3% when comparing lower- and upper-bound TEFs, whereas DL-PCBs contribution to risk increases from 5% to 96%.

Angler (Adult + Child) RME Risk from Consumption of Crab (hepatopancreas + muscle) Based on Various TEFs (TEF_{iL}, TEF_{WHO}, and TEF_{iU})								
Receptor	Expo Pathway	Chemical of Potential Concern	TEF_{iL}		TEF_{WHO}		TEF_{iU}	
			Risk	Contribution to Total Risk (%)	Risk	Contribution to Total Risk (%)	Risk	Contribution to Total Risk (%)
Angler Adult/Child	Crab (H+M)	**Dioxin-Like Compounds**						
		2,3,7,8-TCDD	4.3E-04	70.1%	4.3E-04	51.6%	4.3E-04	2.3%
		1,2,3,7,8-PeCDD	1.1E-06	0.2%	1.1E-05	1.4%	9.1E-06	0.0%
		1,2,3,4,7,8-HxCDD	1.3E-07	0.0%	3.3E-07	0.0%	1.3E-06	0.0%
		1,2,3,6,7,8-HxCDD	2.9E-07	0.0%	9.7E-07	0.1%	9.7E-07	0.0%
		1,2,3,7,8,9-HxCDD	6.9E-08	0.0%	3.5E-07	0.0%	2.4E-07	0.0%
		1,2,3,4,6,7,8-HpCDD	4.5E-08	0.0%	1.1E-07	0.0%	4.5E-07	0.0%
		OCDD	9.9E-09	0.0%	9.9E-09	0.0%	9.9E-08	0.0%
		2,3,7,8-TCDF	1.6E-06	0.3%	1.6E-05	1.9%	4.8E-05	0.3%
		1,2,3,7,8-PeCDF	3.5E-07	0.1%	1.0E-06	0.1%	3.5E-06	0.0%
		2,3,4,7,8-PeCDF	4.0E-06	0.6%	2.4E-05	2.9%	8.0E-05	0.4%
		1,2,3,4,7,8-HxCDF	3.1E-06	0.5%	7.7E-06	0.9%	3.9E-05	0.2%
		1,2,3,6,7,8-HxCDF	2.3E-07	0.0%	2.3E-06	0.3%	2.3E-06	0.0%
		1,2,3,7,8,9-HxCDF	1.4E-07	0.0%	1.4E-07	0.0%	2.8E-07	0.0%
		2,3,4,6,7,8-HxCDF	6.1E-08	0.0%	6.1E-07	0.1%	1.8E-06	0.0%
		1,2,3,4,6,7,8-HpCDF	3.9E-06	0.6%	7.7E-07	0.1%	2.3E-05	0.1%
		1,2,3,4,7,8,9-HpCDF	2.2E-08	0.0%	1.1E-08	0.0%	4.4E-08	0.0%
		OCDF	1.2E-10	0.0%	1.2E-09	0.0%	8.0E-09	0.0%
		PCB-77	6.4E-07	0.1%	3.2E-06	0.4%	3.2E-03	16.9%
		PCB-81	8.4E-07	0.1%	4.2E-07	0.1%	2.8E-05	0.1%
		PCB-105	8.6E-07	0.1%	5.1E-06	0.6%	3.4E-04	1.8%
		PCB-114	2.9E-06	0.5%	4.3E-07	0.1%	2.9E-05	0.2%
		PCB-118	1.5E-06	0.2%	2.3E-05	2.7%	1.5E-03	8.1%
		PCB-123	1.3E-07	0.0%	4.0E-07	0.0%	5.4E-06	0.0%
		PCB-126	1.6E-05	2.6%	1.6E-04	18.9%	6.4E-04	3.4%
		PCB-156/157	6.1E-06	1.0%	1.8E-06	0.2%	1.2E-02	64.8%
		PCB-167	1.3E-07	0.0%	7.7E-07	0.1%	1.0E-05	0.1%
		PCB-169	1.3E-07	0.0%	5.4E-06	0.6%	9.0E-05	0.5%
		PCB-189	2.2E-08	0.0%	1.3E-07	0.0%	4.4E-07	0.0%
		Non-DL PCBs						

Angler (Adult + Child) RME Risk from Consumption of Crab (hepatopancreas + muscle) Based on Various TEFs (TEF_{iL}, TEF_{WHO}, and TEF_{iU})								
			TEF_{iL}		TEF_{WHO}		TEF_{iU}	
Receptor	**Expo Pathway**	**Chemical of Potential Concern**	**Risk**	**Contribution to Total Risk (%)**	**Risk**	**Contribution to Total Risk (%)**	**Risk**	**Contribution to Total Risk (%)**
		Total Non-DL PCBs	7.0E-05	11.4%	7.0E-05	8.4%	7.0E-05	0.4%
		Total DLCs	5E-04	77.2%	7E-04	83.2%	2E-02	99.3%
		Total PCDD/Fs	4E-04	72.5%	5E-04	59.4%	6E-04	3.4%
		Total DL-PCBs	3E-05	4.7%	2E-04	23.8%	2E-02	95.9%
		Total PCBs (DL & NDL)	1E-04	16.1%	3E-04	32.2%	2E-02	96.2%
		TOTAL - All potential COCs	6E-04	100.0%	8E-04	100.0%	2E-02	100.0%

7.3.4 Potential Contribution from Early-life Exposures to Lifetime Risk

The BHHRA addresses the potential increased susceptibility associated with early-life exposure to mutagens (limited to carcinogenic PAHs, trichloroethene, and hexavalent chromium) via use of ADAFs in the cancer risk calculations. Accordingly, all life stages potentially affected are addressed except pre-conception, in utero, and infant (0 to 1 year of age), because the youngest receptor evaluated is a child 1 to <7 years of age. If pregnant or breastfeeding mothers consume NBSA fish or crab, it is possible that an unborn child or nursing infant could be exposed to lipophilic and/or bioaccumulative potential COCs (e.g., PCDD/Fs, PCBs, mercury). The extent to which such women consume NBSA fish or crab is unknown.

7.3.5 Use of Surrogate Values

In several cases, surrogate chemicals (i.e., chemicals that are structurally similar) were used to evaluate risks/hazards from chemicals for which toxicity criteria from USEPA or other approved sources (e.g., ATSDR) are lacking. The use of surrogate toxicity criteria is often necessary, because toxicity information is not available for every chemical detected at complex sites such as the NBSA. The surrogates used in this BHHRA are consistent with those approved for use in the LPRSA BHHRA (AECOM 2017), including several recommended by USEPA's Superfund Health Risk Technical Support Center (STSC), and those recommended in the Revised PAR (Battelle 2018) and subsequent correspondence (USEPA 2018a). The use of toxicity criteria for structurally similar chemical surrogates may over- or underestimate the risk or hazard posed by a COPC lacking such data; however, the overall impact to the BHHRA conclusions is expected to be small.

7.3.6 Tier 3 Toxicity Values

USEPA specifies a level of confidence in Tier 1 (IRIS) and Tier 2 (STSC PPRTV) reference doses of low (e.g., antimony), medium (e.g., benzo(a)pyrene, PCBs) or high (e.g., 2,3,7,8-TCDD). There is additional uncertainty associated with Tier 3 toxicity criteria because of variability in peer review or absence of consensus among the scientific community. The majority of the COPCs in the BHHRA have Tier 1 or Tier 2 toxicity criteria; however, Tier 3 criteria had to be identified for nine COPCs, as summarized in the following table.

COPC	Exposure Media	Tier 3 Toxicity Value	Type	Uncertainty Factor	Source
4,4'-DDD	Surface water, biota	3E-05 mg/kg-day	Oral RfD	300	USEPA PPRTV screening provisional value (USEPA 2017e)
4,4'-DDE	Surface water, biota	5E-04 mg/kg-day	Oral RfD	3000	USEPA PPRTV screening provisional value (USEPA 2017f)
Organic arsenic	Biota	2E-02 mg/kg-day	Oral RfD	100	ATSDR MRL for dimethylarsinic acid (DMA) (ATSDR 2007)
Copper	Sediment, biota	4E-02 mg/kg-day	Oral RfD	NA	HEAST (1997a)
Thallium	Sediment, surface water	1E-05 mg/kg-day	Oral RfD	3000	USEPA PPRTV screening provisional value (USEPA 2012e)
2,3,7,8-TCDD	Sediment, surface water, biota	150,000 $(mg/kg\text{-}day)^{-1}$	Oral CSF	--	HEAST (USEAP 1997a)
Chloroform	Surface water	3.1E-02 $(mg/kg\text{-}day)^{-1}$	Oral CSF		CalEPA (2011)
Hexavalent chromium	Sediment, surface water	0.5 $(mg/kg\text{-}day)^{-1}$	Oral CSF	--	NJDEP (2009)
Mirex	Biota	1.8E-01 $(mg/kg\text{-}day)^{-1}$	Oral CSF	--	CalEPA (1992)

Of these chemicals, only 4,4'-DDD and 2,3,7,8-TCDD (and other DLCs) are identified as potential COCs in fish and crab tissue, which are discussed further below. For the remaining chemicals, the increased uncertainty associated with the use of Tier 3 toxicity criteria does not affect the overall conclusions of the BHHRA (i.e., estimated cancer risks were less than 10^{-6}, and noncancer HIs were less than 0.1 for any receptor with a cumulative risk greater than 10^{-4} or HI greater than 1).

The oral RfD for 4,4'-DDD (which was also used as a surrogate for 2,4'-DDD) is a screening provisional value taken from the PPRTV appendix document (USEPA 2017e). The total uncertainty factor (UF) is 300, and the critical effect is the liver. The hazard quotient for the RME child angler/sportsman is 2 assuming consumption of a mixed fish diet, and 0.5 assuming consumption of a crab muscle and hepatopancreas diet. Accordingly, 4,4'-DDE may be unnecessarily identified as a COPC if the actual toxicity is higher than the current estimate.

The oral CSF for 2,3,7,8-TCDD is 150,000 (mg/kg-day)-1 from HEAST (1997a), which is used as the reference point (along with congener-specific TEFs) for other PCDD/Fs and DL-PCBs. This value was used in the LPRSA BHHRA (AECOM 2017) and specified in the Revised PAR (Battelle 2018). This compound, along with other PCDD/Fs and DL-PCBs, is a major contributor to the cumulative cancer risk associated with consumption of NBSA fish or crab. Other Tier 3 toxicity criteria for 2,3,7,8-TCDD include 156,000 (mg/kg-day)$^{-1}$ (USEPA 1985) and 130,000 (mg/kg-day)$^{-1}$ (CalEPA 2011). These values are sufficiently similar so as to not affect the overall conclusions of the BHHRA.

7.4 Risk Characterization

As discussed in Section 6, risk characterization combines estimates of exposure and dose-response relationships to assess the potential for adverse health effects. There are several ways to introduce uncertainty into the risk characterization process, including simultaneous exposure to multiple chemicals, combination of multiple upper-bound assumptions, consideration of sensitive populations, and potential for risk from background (not site-related) exposures. Each of these issues is discussed in the following sections.

7.4.1 Risk from Multiple Chemicals

Estimated potential cancer risks are first estimated for each COPC individually, and then summed to estimate the cumulative cancer risk for each receptor (USEPA 1989). If two or more of the COPCs act synergistically (the combined effect is greater than additivity) or antagonistically (the combined effect is less than additivity), then the potential cancer risk may be over- or underestimated, respectively. There is relatively little information regarding interactions among groups of chemicals; however, because adding the risks for multiple carcinogenic chemicals assumes that all of the chemicals affect the same target organ by the same mode of action, the assumption of additivity is likely reasonably conservative. Additivity also ignores that individual slope factors reflect upper-bound estimates of potency, and therefore, are not directly additive. Furthermore, adding risks across all carcinogenic chemicals also ignores that there are varying levels of evidence of carcinogenicity in humans. In fact, only a relatively few of the carcinogenic COPCs are considered known human carcinogens. In total, the current method of summing cancer risks across multiple carcinogenic chemicals is unlikely to underestimate the total risk.

Estimated noncancer hazards are also first estimated for each COPC individually, and then summed to estimate the cumulative HI for each receptor (USEPA 1989). In addition, separate HIs are calculated based on target endpoint (e.g., reproductive effects), recognizing that an individual chemical may cause more than one effect (e.g., inorganic arsenic can adversely affect the skin and blood). The uncertainty in this approach is unknown; however, in this assessment, either at least one chemical had an HI greater than 1, or all chemicals had HIs below 1 and the sum was also below 1.

7.4.2 Combination of Several Upper-Bound Assumptions

As discussed in Section 4, consistent with USEPA guidance (USEPA 1992a), two exposure scenarios are evaluated in the BHHRA that represent the reasonable maximum exposure (RME) and central tendency exposure (CTE). One combination of assumptions evaluated is meant to be representative of RME that is above the average case but within the range of reasonably possible exposures (USEPA 1992a). Exposure parameters that are variable or uncertain are selected to be a mix of average and higher-end values within their ranges, avoiding the unrealistically high exposure estimate that would result from using all upper-bound or maximum values. Another combination is meant to be representative of CTE that is the average level of exposure predicted for the receptors (USEPA 1992a). This estimate is developed by assuming average or central tendency values for most or all exposure assumptions.

A number of the values used in the BHHRA are standard default exposure parameter assumptions recommended by USEPA for Superfund site human health risk assessments (USEPA 1989, 1991b, 2004b, 2011, 2012c, 2014). These default assumptions for the RME scenarios were developed by USEPA, in many cases based on large amounts of data, to be used in combination to represent a person (within certain age groups) experiencing the upper range of possible exposures. For example, for the predominant contributing pathway to risks, fish and crab ingestion, the mix of upper-bound and average assumptions used in this BHHRA for RME calculations includes:

- 90^{th} percentile fish and crab consumption rate
- 95% upper confidence limit on the arithmetic mean concentrations of chemicals in fish and crab tissue
- No loss of chemicals from the fish or crab tissue due to cooking or consumption practices (i.e., the upper-bound assumption that fat and cooking juices are always consumed)
- All of the fish/crab consumed comes from the NBSA
- 90^{th} percentile exposure duration
- Mean body weight
- Upper-bound cancer slope factors.

Use of this mix of assumptions results in estimates of potential risk that are likely to be well above the risk that may be experienced by receptors in the NBSA. A more precise characterization of the level of conservatism inherent to the BHHRA estimates is possible through a probabilistic risk assessment (PRA); however, that is not included in this BHHRA.

7.4.3 Risks to Sensitive Populations

Variability within the human population is inevitable, with some people being more sensitive to chemical exposures than others. Accordingly, dose-response values used to estimate risk (cancer slope factors and noncancer reference doses) are generally derived to account for sensitive subpopulations. For example, in both cases, the dose-response value is generally based on the most sensitive species and most sensitive endpoint. In addition, cancer slope factors represent upper-bound values, whereas reference doses routinely include an uncertainty factor of 10 to account for intraspecies differences. Finally, ADAFs were applied to the estimation of cancer risk from mutagenic compounds to account for the potential increased risk of early-life exposures. In total, these assumptions are intended to be protective of the vast majority of the human population

7.4.4 Characterization of Background Risks

As noted in Section 2.1, Newark Bay is in the center of one of the most urbanized and industrialized areas in the United States, and the resultant environmental degradation of the Bay can be attributed to multiple factors. Although a quantitative evaluation of potential risks from regional sources was not conducted as part of this BHHRA, the background evaluation conducted as part of the LPRSA BHHRA (AECOM 2017) is summarized here for context. As part of that evaluation, potential cancer risks and noncancer hazards from fish or crab consumption were estimated based on freshwater fish tissue samples collected in the Passaic River above Dundee Dam and crab tissue samples collected from Jamaica Bay, which is located on the southern side of Long Island. These estimates were based on the same RME exposure assumptions and toxicity criteria used for the LPRSA risk calculations, which are very similar to, if not the same as, those used in the NBSA risk calculations. The estimated background cancer risk for the combined adult/child anger associated with fish consumption was on the order of 4×10^{-4} to 7×10^{-4}, depending on the LPRSA's approach to calculating risk from PCBs. The noncancer HI was on the order of 30 to 40, depending on PCB approach. For crab consumption, the estimated background cancer risk for the combined adult/child angler was on the order of 1×10^{-4} to 3×10^{-4}, and the noncancer HI was on the order of 6 to 9, depending on PCB approach. These estimated background risks are of the same order of magnitude as the cancer risks/noncancer HIs estimated for the NBSA. While not necessarily entirely directly applicable to NBSA, the results of the LPRSA background evaluation indicate that regional contributions to potential COCs identified herein should be considered in the risk management decision-making process.

7.5 Summary of Uncertainty in BHHRA for the NBSA

The evaluation of uncertainty inherent to the BHHRA explains how assumptions used for exposure concentrations, exposure factors, and toxicity factors account for uncertainties in a manner that provides confidence that the BHHRA overestimates rather than underestimates actual risks, particularly for the RME scenarios. In general, this confidence in the conservatism in RME exposure and risk estimates derives from the use of a mix of:

- The lesser of the 95% upper confidence limit of the mean or maximum detected potential COC concentration for the exposure-point concentrations
- Largely high-end and some average exposure factors
- High-end toxicity factors.

The discussion of uncertainties also improves the transparency and understanding of assumptions used in the BHHRA. These RME estimates, along with CTE estimates for perspective, provide useful information about the reliability of the BHHRA results for risk management decision making.

8. Summary and Conclusions

This BHHRA has been conducted as part of the RI/FS for the NBSA to address current and reasonably foreseeable future uses in the absence of controls or remedial actions (i.e., “baseline” conditions). The BHHRA has been performed in a manner consistent with the Revised Pathways Analysis Report (Revised PAR) for the NBSA (Battelle 2018), including receptors and exposure pathways evaluated and exposure assumptions used for both RME and CTE scenarios. In addition, the BHHRA addresses comments and revisions provided by USEPA, USEPA review of responses to comments, and agreed-upon resolutions (USEPA 2017a, 2017b, 2017c, 2018a, 2018b, 2018c).

8.1 Summary of BHRRA for the NBSA

The BHHRA was conducted in accordance with USEPA’s four-step risk assessment paradigm (USEPA 1989):

- Data evaluation and hazard identification
- Exposure assessment
- Toxicity assessment
- Risk characterization.

Each of the four steps is summarized below.

8.1.1 Data Evaluation and Hazard Identification

The BHHRA was based solely on validated data from the RI/FS program, which were collected in accordance with Quality Assurance Project Plans (QAPPs) approved by USEPA Region 2. These include:

- 41 accessible surface sediment samples (including field duplicates) from 39 nearshore and mudflat locations
- 131 near-surface (shallow) surface water samples from six locations in Newark Bay
- 95 samples (including duplicates) from five fish species (American eel, bluefish, striped bass, summer flounder, and white perch)
- 37 samples each of crab muscle only and crab hepatopancreas only.

All data were validated according to approved QAPPs, with nearly all of the data determined to be valid and acceptable for use in the BHHRA, as qualified. A total of 84 chemicals were identified as potential chemicals of concern (potential COCs) in one or more of these media based on a screening process that considered carcinogen status, essential nutrient status, frequency of detection, and comparison of maximum concentrations to risk-based screening levels, consistent with the Revised PAR. These included polychlorinated dibenzo(p)dioxins and furans (PCDD/Fs), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), various pesticides and inorganics, and a few total petroleum hydrocarbon (TPH) ranges, volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). An additional 56 chemicals were evaluated qualitatively in the uncertainty evaluation. The potential COC screening process was designed to ensure that chemicals not identified as potential COCs are only minor contributors to overall site risks and noncancer hazards.

8.1.2 Exposure Assessment

Newark Bay is central to one of the most urbanized and industrialized areas in the United States. Human use of the NBSA is primarily industrial and commercial. Recreational use is limited by access impediments from the shoreline (i.e., bulkhead, bridges, sheet piling, and mudflats) and surrounding urban/industrial/commercial land use. Access for recreation is gained through available public access areas and pleasure boating (i.e., from marinas inside and outside of the NBSA).

Potential receptors and exposure pathways identified for quantitative evaluation in the HHCSM for the NBSA include the following:

- Angler/sportsmen who may be exposed via fish or shellfish ingestion, dermal contact with sediment and surface water, and incidental ingestion of sediment and surface water
- Swimmers, waders, and boaters who may be exposed via dermal contact with sediment and surface water, and incidental ingestion of sediment and surface water
- Workers who may be exposed via dermal contact with sediment and incidental ingestion of sediment.

Potential exposure via inhalation of vapors in outdoor air was excluded from the final cumulative risk estimates based on the results of a quantitative screening-level evaluation that showed negligible risks to all receptors. Other pathways not included were ingestion of waterfowl or species other than fish and crabs, and potential exposure by residential or transient receptors, because these potential exposures are expected to be less than that experienced by the receptors included in the quantitative risk assessment.

The BHHRA included evaluation of both an RME and CTE scenario to provide an estimate of the range of risks of the exposed population, even though decisions at Superfund sites are traditionally based on the RME scenario. The fish and crab ingestion rates established by USEPA Region 2 for the Lower Passaic River Study Area (LPRSA) were used in this BHHRA. Exposure to fish and crab tissue, as well as accessible surface sediment and surface water, is evaluated on a sitewide (Bay-wide) basis. In addition, the exposure-point concentration for both the RME and CTE scenarios is the lower of the 95 percent upper confidence limit (95% UCL) of the arithmetic mean or maximum concentration, consistent with USEPA guidance.

The BHHRA evaluated a “mixed fish” diet to account for the presence of multiple fish species in Newark Bay that may be consumed by anglers, which is assumed to be composed of equal amounts (20%) of the five species collected as part of the RI/FS (American eel, bluefish, striped bass, summer flounder, and white perch). A supplemental analysis of individual fish species diets was included in the uncertainty evaluation. Similarly, the BHHRA evaluated crab muscle and hepatopancreas tissues combined, to account for the possibility that the crab is cooked before the hepatopancreas is removed. A supplemental analysis of a crab-muscle-only diet was included in the uncertainty section. Finally, no cooking loss is considered in the RME scenario for both fish and crab consumption, which assumes that fat, pan drippings, and cooking juices are consumed. For the CTE scenario, cooking loss was included for fish consumption (insufficient data are available for crab consumption).

8.1.3 Toxicity Assessment

The toxicity criteria used in the BHHRA were selected according to USEPA (2003a; 2018e) guidance, including cancer and noncancer criteria for oral and dermal exposures. USEPA (2004b) default dermal absorption factors were used to adjust oral toxicity criteria for evaluating dermal exposure. In addition, USEPA's age-dependent adjustment factors were used to evaluate early-life exposures for chemicals believed to act by a mutagenic mode of action (USEPA 2005c). Blood lead models were used to evaluate potential exposure to lead (USEPA 1994a, 1994b, 2017d; Bowers et al. 1994).

For PCDD/Fs and dioxin-like (DL) PCBs, cancer risks and hazard indices were estimated for the individual congeners, as well as in terms of a total toxicity equivalence (TEQ) for PCDDD/Fs and PCBs (TEQ DF and TEQ PCB, respectively). The toxicity criteria for these compounds are based on the cancer and noncancer criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) and congener-specific toxicity equivalency factors (TEFs). The TEQ DF and TEQ PCB were calculated by two methods: (1) using USEPA's Kaplan-Meier (KM) calculator (Version 9.1; issued July 2014), or (2) manually, based on the TEQ concentration for each congener. The remaining non-DL PCB congeners were evaluated as a group (Total non-DL PCBs) using toxicity criteria for PCBs (high risk) and Aroclor 1254 for cancer and noncancer effects, respectively. Cumulative risk/hazard estimates are presented based on KM TEQs, as well as based on TEQs calculated manually. As discussed further below, there is essentially no difference in the risk/hazard estimates between the two methods; however, the latter method allows for identification of the specific congeners that contribute most to the overall risk/hazard.

8.1.4 Risk Characterization

The estimated cancer risks were compared to the NCP risk range of 10^{-6} to 10^{-4}, and estimated noncancer hazards were compared to a hazard index of 1 (USEPA 1991d). In addition, noncancer hazard indices greater than 1 were evaluated further on a target-organ-specific basis (USEPA 1989). Consumption of NBSA fish or crab by an angler/sportsman represents the only exposure pathways for which estimated potential cancer risks are above the NCP risk range of 10^{-6} to 10^{-4} and noncancer HIs are above one. Estimated cancer risks/hazard associated with direct contact with accessible surface sediment and surface water are below the NCP risk range and noncancer protection goal for all receptors. The results of the risk characterization are summarized in the following sections, as well as in Figure 8-1 (cumulative cancer risks) and Figures 8-2 through 8-5 (cumulative noncancer HIs for four target organs with HIs greater than 1).

8.1.4.1 Fish Consumption

The cumulative potential cancer risk for the RME combined adult/child angler/sportsman who routinely consumes a mixed diet of self-caught fish over a period of 26 years is 8×10^{-4}, regardless of TEQ approach, as shown in the summary table below. The primary contributors to the RME cumulative potential cancer risks are 2,3,7,8-TCDD, which contributes approximately 28% (33% or 34% for all PCDD/Fs, depending on TEQ approach), PCB-126, which contributes approximately 31% (36% or 38% for all DL-PCBs, depending on TEQ approach), and non-DL PCBs, which contributes approximately 18% or 19%, depending on TEQ approach.[6] Minor contributors to the cumulative cancer risk include pesticides (approximately 5%) and inorganic arsenic (approximately 4%); however, these risks are within or below the NCP risk range. Potential cancer risks associated with direct contact with accessible surface sediment or surface water are below the NCP risk range for the RME scenario.

Summary of Angler/Sportsman Fish Consumption Cancer Risk and Percent Contribution to Cumulative Risk for Potential COCs

RME Adult/Child Angler/Sportsman — Consumption of Mixed Fish Diet

Potential COC	Cancer Risk					
	Accessible Surface Sediment (a)	Surface Water (a)	Mixed Fish Diet (b)	Total Potential Risk	Percent Contribution to Cumulative Risk (excluding KM TEQ) (c)(d)(e)	Percent Contribution to Cumulative Risk (based on KM TEQ)
2,3,7,8-TCDD	6E-07	9E-10	2E-04	2E-04	28%	--
1,2,3,7,8-PeCDD	3E-08	3E-10	1E-05	1E-05	2%	--
1,2,3,6,7,8-HxCDD	1E-08	4E-11	2E-06	2E-06	0.2%	--
2,3,7,8-TCDF	1E-08	4E-11	5E-06	5E-06	1%	--
1,2,3,7,8-PeCDF	2E-09	9E-12	1E-06	1E-06	0.2%	--
2,3,4,7,8-PeCDF	4E-08	2E-10	2E-05	2E-05	3%	--
1,2,3,4,7,8-HxCDF	6E-08	1E-10	3E-06	3E-06	0.4%	--
1,2,3,6,7,8-HxCDF	1E-08	3E-11	3E-06	3E-06	0.3%	--
Total PCDD/Fs (excluding KM TEQ)	8E-07	2E-09	3E-04	3E-04	34%	--
Total PCDD/Fs (based on KM TEQ)	8E-07	2E-09	3E-04	3E-04	--	33%
PCB-77	6E-09	2E-12	1E-06	1E-06	0.2%	--
PCB-105	3E-09	2E-12	6E-06	6E-06	0.8%	--
PCB-118	8E-09	4E-12	3E-05	3E-05	3.2%	--
PCB-126	2E-07	5E-11	2E-04	2E-04	31.0%	--
PCB-156/157	7E-10	5E-13	2E-06	2E-06	0.3%	--
PCB-167	3E-10	2E-13	1E-06	1E-06	0.1%	--
PCB-169	6E-08	9E-12	3E-06	3E-06	0.4%	--
Total DL-PCBs (excluding KM TEQ)	3E-07	7E-11	3E-04	3E-04	36%	--
Total DL-PCBs (based on KM TEQ)	2E-07	8E-11	3E-04	3E-04	--	38%

[6] The percentages presented in this section may be slightly different from those presented in Section 6, because the small contributions from potential exposure to accessible surface sediment and surface water are included.

Summary of Angler/Sportsman Fish Consumption Cancer Risk and Percent Contribution to Cumulative Risk for Potential COCs

RME Adult/Child Angler/Sportsman — Consumption of Mixed Fish Diet

Potential COC	Cancer Risk					
	Accessible Surface Sediment (a)	Surface Water (a)	Mixed Fish Diet (b)	Total Potential Risk	Percent Contribution to Cumulative Risk (excluding KM TEQ) (c)(d)(e)	Percent Contribution to Cumulative Risk (based on KM TEQ)
Total Non-DL PCBs	2E-07	7E-11	1E-04	1E-04	19%	18%
Benzo(a)pyrene	3E-07	8E-11	3E-06	3E-06	0.4%	0.4%
Dibenz(a,h)anthracene	6E-08	2E-11	3E-06	3E-06	0.4%	0.4%
2,4'-DDD	--	1E-10	8E-07	8E-07	0.1%	0.1%
4,4'-DDD	--	4E-10	4E-06	4E-06	0.5%	0.5%
4,4'-DDE	--	6E-13	8E-06	8E-06	1%	1%
Chlordane, alpha (cis)	--	--	1E-06	1E-06	0.1%	0.1%
Dieldrin	--	5E-09	2E-05	2E-05	3%	3%
Heptachlor epoxide, cis-	--	9E-10	3E-06	3E-06	0.4%	0.4%
Heptachlor epoxide, trans-	--	--	1E-07	1E-07	0.02%	0.02%
Nonachlor, trans-	--	--	1E-06	1E-06	0.1%	0.1%
Arsenic, inorganic	2E-06	2E-08	3E-05	3E-05	4%	4%
Total Potential Risk (excluding KM TEQs) (f)(g)	**4E-06**	**5E-08**	**8E-04**	**8E-04**	**99%**	**--**
Total Potential Risk (with KM TEQs) (f)(g)	**4E-06**	**5E-08**	**8E-04**	**8E-04**	**--**	**99%**

Notes:
Highlighting indicates potential risk exceeding the NCP risk range of 1E-6 to 1E-4.
(a) Adult age group. Child angler is not assumed to be exposed to sediment or surface water.
(b) Combined adult/child.
(c) Total PCDD/Fs (excluding KM TEQ)—contains contribution of all PCDD/F congeners.
(d) Total DL-PCBs (excluding KM TEQ)—contains contribution of all DL-PCB congeners.
(e) Individual congener percentage contributions were not included in total percent cumulative risk.
(f) Includes risks posed by other potential COCs not shown in table.
(g) The sum of percent contribution may not be the same as when the individual values are summed due to rounding.

The cumulative potential noncancer HIs for the RME child angler who routinely consumes fish from the NBSA is 40, regardless of TEQ approach, as shown in the summary table below. As with excess cancer risk, the primary contributors to the cumulative potential HIs are 2,3,7,8-TCDD, which contributes approximately 19% (22% or 23% for all PCDD/Fs, depending on TEQ approach), PCB-126, which contributes approximately 21% (24% to 26% for all DL-PCBs, depending on TEQ approach), and non-DL PCBs, which contribute approximately 32% or 33%, depending on TEQ approach. The highest target-organ-specific HI is 20 for reproductive effects (DLCs), regardless of TEQ approach. The next-highest target-organ-specific HI is 10 for whole-body effects (non-DL PCBs), regardless of TEQ approach. Liver (pesticides) and neurological effects (methyl mercury) are the only other target-organ-specific HIs greater than one (5 and 2, respectively).

Summary of Angler/Sportsman Fish Consumption Noncancer Hazard and Percent Contribution to Cumulative Hazards for Potential COCs RME Child Angler/Sportsman — Consumption of Mixed Fish Diet							
Primary Target Organ(s)	Potential COC	Noncancer Hazard					
		Accessible Surface Sediment (a)	Surface Water (a)	Mixed Fish Diet	Total Hazard	Percent Contribution to Cumulative Hazard (excluding KM TEQ) (b)(c)(d)	Percent Contribution to Cumulative Hazard (based on KM TEQ)
Reproductive	2,3,7,8-TCDD	--	--	8E+00	8E+00	19%	--
	1,2,3,7,8-PeCDD	--	--	4E-01	4E-01	1%	--
	1,2,3,6,7,8-HxCDD	--	--	6E-02	6E-02	0.1%	--
	2,3,7,8-TCDF	--	--	2E-01	2E-01	0.4%	--
	1,2,3,7,8-PeCDF	--	--	4E-02	4E-02	0.1%	--
	2,3,4,7,8-PeCDF	--	--	7E-01	7E-01	2%	--
	1,2,3,4,7,8-HxCDF	--	--	1E-01	1E-01	0.2%	--
	1,2,3,6,7,8-HxCDF	--	--	1E-01	1E-01	0.2%	--
	Total PCDD/Fs (excluding KM TEQ)	--	--	1E+01	1E+01	23%	--
	Total PCDD/Fs (based on KM TEQ)	--	--	1E+01	1E+01	--	22%
	PCB-77	--	--	5E-02	5E-02	0.1%	--
	PCB-105	--	--	2E-01	2E-01	1%	--
	PCB-118	--	--	9E-01	9E-01	2%	--
	PCB-126	--	--	9E+00	9E+00	21%	--
	PCB-156/157	--	--	8E-02	8E-02	0.2%	--
	PCB-167	--	--	4E-02	4E-02	0.1%	--
	PCB-169	--	--	1E-01	1E-01	0.3%	--
	Total DL-PCBs (excluding KM TEQ)	--	--	1E+01	1E+01	24%	--
	Total DL-PCBs (based on KM TEQ)	--	--	1E+01	1E+01	--	26%
Whole Body	Total Non-DL PCBs	--	--	1E+01	1E+01	33%	32%
Developmental	Benzo(a)pyrene	--	--	2E-02	2E-02	0.04%	0.04%
Liver	2,4'-DDD	--	--	4E-01	4E-01	1%	1%
	4,4'-DDD	--	--	2E+00	2E+00	5%	5%
	4,4'-DDE	--	--	3E-01	3E-01	1%	1%
	Chlordane, alpha (cis)	--	--	2E-02	2E-02	0.1%	0.1%
	Dieldrin	--	--	1E-01	1E-01	0.2%	0.2%
	Heptachlor epoxide, cis-	--	--	1E-01	1E-01	0.2%	0.2%
	Nonachlor, trans-	--	--	7E-01	7E-01	2%	2%
	Pyridine	--	--	9E-01	9E-01	2%	2%
Skin, Blood	Arsenic, inorganic	--	--	3E-01	3E-01	1%	1%
Thyroid	Cobalt	--	--	5E-01	5E-01	1%	1%
Immune	Mercury	--	--	7E-01	7E-01	2%	2%
Neurological	Methyl Mercury	--	--	2E+00	2E+00	6%	6%
	Total Hazard (excluding KM TEQ) (e)(f)	**--**	**--**	**4E+01**	**4E+01**	**99%**	**--**
	Total Hazard (based on KM TEQ) (e)(f)	**--**	**--**	**4E+01**	**4E+01**	**--**	**99%**

Notes:
Highlighting indicates that the hazard exceeds the goal of protection of a hazard index of one.
(a) Child angler is not assumed to be exposed to sediment or surface water.
(b) Total PCDD/Fs (excluding KM TEQ)—contains contribution of all PCDD/F congeners.

Summary of Angler/Sportsman Fish Consumption Noncancer Hazard and Percent Contribution to Cumulative Hazards for Potential COCs RME Child Angler/Sportsman — Consumption of Mixed Fish Diet							
		Noncancer Hazard					
Primary Target Organ(s)	Potential COC	Accessible Surface Sediment (a)	Surface Water (a)	Mixed Fish Diet	Total Hazard	Percent Contribution to Cumulative Hazard (excluding KM TEQ) (b)(c)(d)	Percent Contribution to Cumulative Hazard (based on KM TEQ)
(c) Total DL-PCBs (excluding KM TEQ)—contains contribution of all DL-PCB congeners. (d) Individual congener percentage contributions were not included in total percent cumulative hazard. (e) Includes hazard posed by other potential COCs not shown in table. (f) The sum of percent contribution may not be the same as when the individual values are summed due to rounding.							

The cumulative potential cancer risks for the CTE scenario for mixed fish diet are within the NCP risk range. For noncancer HIs, the only CTE target organ-specific HI greater than 1 is for reproductive effects (DLCs), where the HI is 2, regardless of TEQ approach.

8.1.4.2 Crab Consumption

The cumulative potential cancer risk for the RME combined adult/child angler/sportsman who routinely consumes a diet of self-caught crab muscle and hepatopancreas over a period of 26 years is also 8×10^{-4}, regardless of TEQ approach, as shown in the summary table below. The primary contributors to the RME cumulative potential cancer risks are 2,3,7,8-TCDD, which contributes approximately 52% (59% or 60% for all PCDD/Fs, depending on TEQ approach), PCB-126, which contributes approximately 19% (23% or 24% for all DL-PCBs, depending on TEQ approach), and non-DL PCBs, which contributes approximately 8%, regardless of TEQ approach. Minor contributors to the cumulative cancer risk include inorganic arsenic (approximately 6%) and pesticides (approximately 2%); however, these risks are within or below the NCP risk range. Potential cancer risks associated with direct contact with accessible surface sediment or surface water are below the NCP risk range for the RME scenario.

Summary of Angler/Sportsman Crab Consumption Cancer Risk and Percent Contribution to Cumulative Risk for Potential COCs

RME Adult/Child Angler/Sportsman — Consumption of Crab Muscle and Hepatopancreas

Potential COC	Cancer Risk					
	Accessible Surface Sediment (a)	Surface Water (a)	Crab Muscle & Hepato (b)	Total Potential Risk	Percent Contribution to Cumulative Risk (excluding KM TEQ) (c)(d)(e)	Percent Contribution to Cumulative Risk (based on KM TEQ)
2,3,7,8-TCDD	4E-07	6E-10	4E-04	4E-04	52%	--
1,2,3,7,8-PeCDD	2E-08	2E-10	1E-05	1E-05	1%	--
2,3,7,8-TCDF	7E-09	2E-11	2E-05	2E-05	2%	--
1,2,3,7,8-PeCDF	1E-09	6E-12	1E-06	1E-06	0.1%	--
2,3,4,7,8-PeCDF	2E-08	1E-10	2E-05	2E-05	3%	--
1,2,3,4,7,8-HxCDF	3E-08	9E-11	8E-06	8E-06	1%	--
1,2,3,6,7,8-HxCDF	9E-09	2E-11	2E-06	2E-06	0.3%	--
Total PCDD/Fs (excluding KM TEQ)	5E-07	1E-09	5E-04	5E-04	59%	--
Total PCDD/Fs (based on KM TEQ)	5E-07	1E-09	5E-04	5E-04	--	60%
PCB-77	4E-09	1E-12	3E-06	3E-06	0.4%	--
PCB-105	2E-09	1E-12	5E-06	5E-06	1%	--
PCB-118	5E-09	2E-12	2E-05	2E-05	3%	--
PCB-126	1E-07	3E-11	2E-04	2E-04	19%	--
PCB-156/157	5E-10	3E-13	2E-06	2E-06	0.2%	--
PCB-169	4E-08	6E-12	5E-06	5E-06	1%	--
Total DL-PCBs (excluding KM TEQ)	2E-07	4E-11	2E-04	2E-04	24%	--
Total DL-PCBs (based on KM TEQ)	1E-07	5E-11	2E-04	2E-04	--	23%
Total Non-DL PCBs	1E-07	5E-11	7E-05	7E-05	8%	8%
4,4'-DDD	--	2E-10	9E-07	9E-07	0.1%	0.1%
4,4'-DDE	--	4E-13	4E-06	4E-06	0.4%	0.4%
Dieldrin	--	3E-09	1E-05	1E-05	1%	1%
Heptachlor epoxide, cis-	--	6E-10	4E-06	4E-06	0.4%	0.4%
Heptachlor epoxide, trans-	--	--	1E-06	1E-06	0.1%	0.1%
Nonachlor, trans-	--	--	4E-07	4E-07	0.05%	0.05%
Arsenic, inorganic	1E-06	1E-08	5E-05	5E-05	6%	6%
Total Potential Risk (excluding KM TEQs) (f)(g)	**2E-06**	**3E-08**	**8E-04**	**8E-04**	**100%**	**--**
Total Potential Risk (with KM TEQs) (f)(g)	**2E-06**	**3E-08**	**8E-04**	**8E-04**	**--**	**100%**

Notes:
Highlighting indicates potential risk exceeding the NCP risk range of 1E-6 to 1E-4
(a) Adult age group. Child angler is not assumed to be exposed to sediment or surface water.
(b) Combined adult/child
(c) Total PCDD/Fs (excluding KM TEQ)—contains contribution of all PCDD/F congeners.
(d) Total DL-PCBs (excluding KM TEQ)—contains contribution of all DL-PCB congeners.
(e) Individual congener percentage contributions were not included in total percent cumulative risk.
(f) Includes risks posed by other potential COCs not shown in table.
(g) The sum of percent contribution may not be the same as when the individual values are summed due to rounding.

The cumulative potential noncancer HIs for the RME child angler who routinely consumes muscle and hepatopancreas from the NBSA is 30, regardless of TEQ approach, as shown in the summary table below. As with excess cancer risk, the primary contributors to the cumulative potential HIs are 2,3,7,8-TCDD, which contributes approximately 44% (51% for all PCDD/Fs, regardless of TEQ approach), PCB-126, which contributes approximately 16% (20% for all DL-PCBs, regardless of TEQ approach), and non-DL PCBs, which contribute approximately 19%, regardless of TEQ approach. The highest target-organ-specific HI is 20 for reproductive effects (DLCs), regardless of TEQ approach. The next-highest target-organ-specific HI is 7 for whole-body effects (non-DL PCBs), regardless of TEQ approach. The remaining target-organ-specific HIs are equal to or less than 1.

Summary of Angler/Sportsman Crab Consumption Noncancer Hazard and Percent Contribution to Cumulative Hazards for Potential COCs

RME Child Angler/Sportsman — Consumption of Crab Muscle and Hepatopancreas

Primary Target Organ(s)	Potential COC	Noncancer Hazard					
		Accessible Surface Sediment (a)	Surface Water (a)	Crab Muscle & Hepato	Total Hazard	Percent Contribution to Cumulative Hazard (excluding KM TEQ) (b)(c)(d)	Percent Contribution to Cumulative Hazard (based on KM TEQ)
Reproductive	2,3,7,8-TCDD	--	--	2E+01	2E+01	44%	--
	1,2,3,7,8-PeCDD	--	--	4E-01	4E-01	1%	--
	2,3,7,8-TCDF	--	--	6E-01	6E-01	2%	--
	1,2,3,7,8-PeCDF	--	--	4E-02	4E-02	0.1%	--
	2,3,4,7,8-PeCDF	--	--	9E-01	9E-01	2%	--
	1,2,3,4,7,8-HxCDF	--	--	3E-01	3E-01	0.8%	--
	1,2,3,6,7,8-HxCDF	--	--	8E-02	8E-02	0.2%	--
	Total PCDD/Fs (excluding KM TEQ)	--	--	2E+01	2E+01	51%	--
	Total PCDD/Fs (based on KM TEQ)	--	--	2E+01	2E+01	--	51%
	PCB-77	--	--	1E-01	1E-01	0.3%	--
	PCB-105	--	--	2E-01	2E-01	0.5%	--
	PCB-118	--	--	8E-01	8E-01	2%	--
	PCB-126	--	--	6E+00	6E+00	16%	--
	PCB-156/157	--	--	7E-02	7E-02	0.2%	--
	PCB-169	--	--	2E-01	2E-01	0.5%	--
	Total DL-PCBs (excluding KM TEQ)	--	--	7E+00	7E+00	20%	--
	Total DL-PCBs (based on KM TEQ)	--	--	7E+00	7E+00	--	20%
Whole Body	Total Non-DL PCBs	--	--	7E+00	7E+00	19%	19%
Liver	4,4'-DDD	--	--	5E-01	5E-01	1%	1%
	4,4'-DDE	--	--	1E-01	1E-01	0.4%	0.4%
	Dieldrin	--	--	5E-02	5E-02	0.1%	0.1%
	Heptachlor epoxide, cis-	--	--	1E-01	1E-01	0.3%	0.3%
	Heptachlor epoxide, trans-	--	--	4E-02	4E-02	0.1%	0.1%
	Nonachlor, trans-	--	--	3E-01	3E-01	0.8%	1%
	Pyridine	--	--	2E-01	2E-01	0.6%	1%
Skin, Blood	Arsenic, inorganic	--	--	4E-01	4E-01	1%	1%
Urinary	Cadmium	--	--	2E-01	2E-01	0.5%	0.5%

Summary of Angler/Sportsman Crab Consumption Noncancer Hazard and Percent Contribution to Cumulative Hazards for Potential COCs

RME Child Angler/Sportsman — Consumption of Crab Muscle and Hepatopancreas

Primary Target Organ(s)	Potential COC	Noncancer Hazard					
		Accessible Surface Sediment (a)	Surface Water (a)	Crab Muscle & Hepato	Total Hazard	Percent Contribution to Cumulative Hazard (excluding KM TEQ) (b)(c)(d)	Percent Contribution to Cumulative Hazard (based on KM TEQ)
Thyroid	Cobalt	--	--	1E-01	1E-01	0.3%	0.4%
GI Tract	Copper	--	--	3E-01	3E-01	1%	1%
Immune	Mercury	--	--	2E-01	2E-01	1%	1%
Neurological	Methyl Mercury	--	--	7E-01	7E-01	2%	2%
	Total Hazard (excluding KM TEQ) (e)(f)	**--**	**--**	**3E+01**	**3E+01**	**99%**	**--**
	Total Hazard (based on KM TEQ) (e)(f)	**--**	**--**	**3E+01**	**3E+01**	**--**	**99%**

Notes:
Highlighting indicates that the hazard exceeds the goal of protection of a hazard index of one.
(a) Child angler is not assumed to be exposed to sediment or surface water.
(b) Total PCDD/Fs (excluding KM TEQ)—contains contribution of all PCDD/F congeners.
(c) Total DL-PCBs (excluding KM TEQ)—contains contribution of all DL-PCB congeners.
(d) Individual congener percentage contributions were not included in total percent cumulative hazard.
(e) Includes hazard posed by other potential COCs not shown in table.
(f) The sum of percent contribution may not be the same as when the individual values are summed due to rounding.

The cumulative potential cancer risks for the CTE scenario for a crab muscle and hepatopancreas diet are within the NCP risk range. For noncancer HIs, the only CTE target organ-specific HI greater than 1 is for reproductive effects (DLCs), where the HI is 4, regardless of TEQ approach.

8.1.4.3 Direct Contact with Sediment and Surface Water

Cumulative potential cancer risks and noncancer HIs associated with direct contact with accessible surface sediment and surface water in the NBSA while angling, swimming, wading, or boating are within or below the NCP risk range of 10^{-6} to 10^{-4} and noncancer protection goal of an HI of 1.

8.1.4.4 Identification of Potential Chemicals of Concern

Potential COCs were identified in cases when the potential cumulative cancer risk or noncancer HI for a receptor exceed 10^{-4} or 1, respectively. In these cases, potential COCs were any COPC with an individual pathway cancer risk greater than 10^{-6} or noncancer HI greater than 0.1. The following table summarizes the COPCs for the RME scenario (no COPCs were identified for surface water for either the RME or CTE scenario).

Potential COC	Accessible Surface Sediment	Mixed Fish Diet	Crab Muscle and Hepatopancreas
Dioxin-like Compounds			
2,3,7,8-TCDD		X	X
1,2,3,7,8-PeCDD		X	X
1,2,3,6,7,8-HxCDD		X	
2,3,7,8-TCDF		X	X
1,2,3,7,8-PeCDF		X	X
2,3,4,7,8-PeCDF		X	X
1,2,3,4,7,8-HxCDF		X	X
1,2,3,6,7,8-HxCDF		X	X
Total PCDD/Fs (excluding KM TEQ)		X	X
Total PCDD/Fs (based on KM TEQ)		X	X
PCB-77		X	X
PCB-105		X	X
PCB-118		X	X
PCB-126		X	X
PCB-156/157		X	X
PCB-167		X	
PCB-169		X	X
Total DL-PCBs (excluding KM TEQ)		X	X
Total DL-PCBs (based on KM TEQ)		X	X
Non-DL PCBs			
Total Non-DL PCBs		X	X
PAHs			
Benzo(a)pyrene		X	
Dibenz(a,h)anthracene		X	
Pesticides & Organics			
2,4'-DDD		X	
4,4'-DDD		X	X
4,4'-DDE		X	X
Chlordane, alpha (cis)		X	
Dieldrin		X	X
Heptachlor epoxide, cis-		X	X
Heptachlor epoxide, trans-			X
Nonachlor, trans-		X	X
Pyridine		X	X
Inorganics			
Arsenic, inorganic	X	X	X
Cadmium			X
Cobalt		X	X
Copper			X
Mercury		X	X
Methyl Mercury		X	X

8.2 Conclusions

The conclusions of the BHHRA for the NBSA are summarized below. The results for both the RME and CTE scenarios are discussed; however, risk management decisions are based on the RME scenario.

8.2.1 Fish and Crab

Consumption of self-caught fish or crab from the NBSA presents the primary source of potential risk to human health. For the RME scenario, which is intended to represent an upper bound of exposure, the potential cancer risk and noncancer hazards to anglers/sportsman who are assumed to routinely consume their catch (34.6 g/day for an adult and 11.5 g/day for a child for fish, or 21 g/day for an adult and 7 g/day for a child for crab, over a period of 26 years) exceed the NCP risk range of 10^{-6} to 10^{-4} and a noncancer protection goal of an HI of 1. The RME cancer risk for the combined adult/child angler sportsman is 8×10^{-4} for both fish and crab consumption, and the noncancer HIs for the child angler are 40 for fish consumption and 30 for crab consumption.

For the CTE scenario, which is based on average exposure levels (3.9 g/day for an adult and 1.3 g/day for a child for fish, or 3 g/day for an adult and 1 g/day for a child for crab over a period of 12 years), the potential cancer risks for the combined adult/child angler/sportsman who consumes fish or crab from the NBSA are within the NCP risk range; however, noncancer HIs for the child angler/sportsman above the noncancer protection goal (i.e., 4 for fish consumption and 3 for crab consumption).

The primary potential COCs for fish and crab ingestion are 2,3,7,8-TCDD, PCB-126, and non-DL PCBs, with some pesticides, inorganic arsenic, and/or methyl mercury also contributing to the cumulative risks/hazards for both the RME and CTE scenarios. The percent contribution of key potential COCs for the RME scenario are summarized below.

8.2.1.1 Fish consumption

- Cancer risk (combined adult/child scenario): 2,3,7,8-TCDD contributes approximately 28% (risk of 2×10^{-4}), PCB-126 contributes approximately 31% (risk of 2×10^{-4}), and non-DL PCBs contribute approximately 18% or 19%, depending on TEQ approach (risk of 1×10^{-4} regardless of TEQ approach).
  - All PCDD/Fs contribute 33% or 34%, depending on TEQ approach (risk of 3×10^{-4} regardless of approach).
  - All DL-PCBs contribute 36% or 38% for all DL-PCBs, depending on TEQ approach (risk of 3×10^{-4} regardless of approach).
  - Minor contributors include pesticides (approximately 5%, maximum risk among pesticides of 2×10^{-5} for dieldrin) and inorganic arsenic (approximately 4%, which equates to a risk of 3×10^{-5}).
- Noncancer hazard (child scenario): 2,3,7,8-TCDD contributes approximately 19% (HQ of 8), PCB-126 contributes approximately 21% (HQ of 9), and non-DL PCBs contribute approximately 33% or 32%, depending on TEQ approach (HI of 10, regardless of approach).
  - All PCDD/Fs contribute 22% or 23%, depending on TEQ approach (HI of 10, regardless of approach).
  - All DL-PCBs contribute 24% or 26%, depending on TEQ approach (HI of 10, regardless of approach).

    - Minor contributors include pesticides (approximately 8% or 9%, depending on TEQ method, maximum HQ among pesticides of 2 for 4,4'-DDD) and methyl mercury (approximately 6%, which equates to an HQ of 2).
    - Target-organ-specific HIs greater than 1 include reproductive (DLCs), whole-body (non-DL PCBs), liver (pesticides, organics), and neurological (methyl mercury).

8.2.1.2 Crab consumption

- Cancer risk (combined adult/child scenario): 2,3,7,8-TCDD contributes approximately 52% (risk of 4×10^{-4}), PCB-126 contributes approximately 19% (risk of 2×10^{-4}), and non-DL PCBs contribute approximately 8%, regardless of TEQ approach (risk of 7×10^{-5}).
    - All PCDD/Fs contribute 59% or 60%, depending on TEQ approach (risk of 5×10^{-4} regardless of approach).
    - All DL-PCBs contribute 23% or 24% for all DL-PCBs, depending on TEQ approach (risk of 2×10^{-4} regardless of approach).
    - Minor contributors include inorganic arsenic (approximately 6%, which equates to a risk of 5×10^{-5}) and pesticides (approximately 2%, maximum risk among pesticides of 1×10^{-5} for dieldrin).
- Noncancer hazard (child scenario): 2,3,7,8-TCDD contributes approximately 44% (HQ of 20), PCB-126 contributes approximately 16% (HQ of 7), and non-DL PCBs contribute approximately 19%, regardless of TEQ approach (HI of 7).
    - All PCDD/Fs contribute 51%, regardless of approach (HI of 20).[7]
    - All DL-PCBs contribute 20%, regardless of TEQ approach (HI of 7).
    - Minor contributors include pesticides (approximately 3%, regardless of TEQ method, maximum HQ among pesticides of 0.5 for 4,4'-DDD) and methyl mercury (approximately 2%, which equates to an HQ of 0.7).
    - Target-organ-specific HIs greater than 1 include reproductive (DLCs) and whole-body (non-DL PCBs).

As discussed in Section 7.3.3, the TEFs for DL compounds carry considerable uncertainty, particularly for some of the DL-PCBs. Consistent with USEPA (2010a), a sensitivity analysis was conducted to illustrate the impact of the TEFs on the overall risk estimates and percent contribution of individual congeners or groups of congeners. For all congeners except 2,3,7,8-TCDD, the lower- and upper-bound TEFs were the 10th and 90th percentiles from *in vitro* and *in vivo* studies included in the relative effects potency (ReP) database (USEPA 2010a). The TEF for 2,3,7,8-TCDD remains constant in all scenarios. Accordingly, while the estimated risk for 2,3,7,8-TCDD remains constant, the contribution to risk can change, as can the relative contributions of all PCDD/Fs, all DL-PCBs, and all PCBs (non-DL and DL-PCBs). For example, for the combined adult/child angler/sportsman who consumes a mixed fish diet, the percent contribution for 2,3,7.8-

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7 The HQ for 2,3,7,8-TCDD is also shown as 20 due to rounding; however, other PCDD/F congeners also contribute to the total HI for all PCDD/Fs.

TCDD increases from 28% to 44% when using the lower-bound TEFs, but decreases to only 1% when using the upper-bound TEFs. Conversely, the percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 37% when using lower-bound TEFs to 98% when upper-bound TEFs are used. Similarly, for crab muscle and hepatopancreas consumption, the percent contribution of 2,3,7,8-TCDD increases from 52% to 70% when using the lower-bound TEFs but decreases to approximately 2% when using the upper-bound TEFs. The percent contribution to overall risk for Total PCBs (DL-PCBs and Non-DL PCBs) increases from 16% when using lower-bound TEFs to 96% when upper-bound TEFs are used (see Section 7.3.3).

The specific species or tissue type(s) that make up a fish or crab diet can influence the estimated risk, because some species or tissue types have been shown to have higher tissue burdens of bioaccumulative chemicals than others. Fillet data were collected for five fish species from the NBSA: American eel, bluefish, striped bass, summer flounder, and white perch. The estimated cancer risks associated with consumption of any combination of these fish species exceed the NCP risk range for the RME scenario, but not the CTE scenario. The estimated noncancer HIs exceed the noncancer protection goal of an HI of 1 for both the RME and CTE scenarios. More significantly, the estimated cancer risks associated with consumption of crab muscle only are approximately a factor of 6 lower than for consumption of crab muscle and hepatopancreas combined, and are within the NCP risk range even for the RME scenario. For noncancer effects, the noncancer HIs for a muscle-only diet are also approximately a factor of 6 lower than for muscle and hepatopancreas combined, but remain above the noncancer goal even for the CTE scenario.

8.3 Sediment and Surface Water

The cumulative potential cancer risks and noncancer HIs associated with direct contact with accessible surface sediment and surface water in the NBSA while angling, swimming, wading or boating, are much lower than those associated with fish or crab consumption and are within or below the NCP risk range of 10^{-6} to 10^{-4} and noncancer protection goal of an HI of 1.

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Tables

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
Butyltins				
ORGANOTINS_GC	Dibutyltin	1002-53-5	17	24
ORGANOTINS_GC	Monobutyltin	2406-65-7	17	24
ORGANOTINS_GC	Tetrabutyltin	1461-25-2	17	24
ORGANOTINS_GC	Tributyltin	688-73-3	17	24
Dioxins-Furans				
E1613B	1,2,3,4,6,7,8-HpCDD	35822-46-9	17	24
E1613B	1,2,3,4,6,7,8-HpCDF	67562-39-4	17	24
E1613B	1,2,3,4,7,8,9-HpCDF	55673-89-7	17	24
E1613B	1,2,3,4,7,8-HxCDD	39227-28-6	17	24
E1613B	1,2,3,4,7,8-HxCDF	70648-26-9	17	24
E1613B	1,2,3,6,7,8-HxCDD	57653-85-7	17	24
E1613B	1,2,3,6,7,8-HxCDF	57117-44-9	17	24
E1613B	1,2,3,7,8,9-HxCDD	19408-74-3	17	24
E1613B	1,2,3,7,8,9-HxCDF	72918-21-9	17	24
E1613B	1,2,3,7,8-PeCDD	40321-76-4	17	24
E1613B	1,2,3,7,8-PeCDF	57117-41-6	17	24
E1613B	2,3,4,6,7,8-HxCDF	60851-34-5	16 (b)	24
E1613B	2,3,4,7,8-PeCDF	57117-31-4	17	24
E1613B	2,3,7,8-TCDD	1746-01-6	17	24
E1613B	2,3,7,8-TCDF	51207-31-9	17	24
E1613B	OCDD	3268-87-9	17	24
E1613B	OCDF	39001-02-0	17	24
Herbicides				
SW8151A	2,4,5-T	93-76-5	17	24
SW8151A	2,4,5-TP (Silvex)	93-72-1	17	24
SW8151A	2,4-D	94-75-7	17	24
SW8151A	2,4-DB	94-82-6	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
Metals				
SW6020	Aluminum	7429-90-5	17	24
E350.2	Ammonia Nitrogen	7664-41-7	17	24
SW6020	Antimony	7440-36-0	17	24
SW6020	Arsenic	7440-38-2	17	24
SW6020	Barium	7440-39-3	17	24
SW6020	Beryllium	7440-41-7	17	24
SW6020	Cadmium	7440-43-9	17	24
SW6020	Calcium	7440-70-2	17	24
SW6020	Chromium	7440-47-3	17	24
SW6020	Cobalt	7440-48-4	17	24
SW6020	Copper	7440-50-8	17	24
SW7196A	Hexavalent Chromium	18540-29-9	17	24
SW6020	Iron	7439-89-6	17	24
SW6020	Lead	7439-92-1	17	24
SW6020	Magnesium	7439-95-4	17	24
SW6020	Manganese	7439-96-5	17	24
E1631B	Mercury	7439-97-6	17	24
E1630M	Methyl Mercury	22967-92-6	17	24
SW6020	Nickel	7440-02-0	17	24
E365.1	Phosphorus	7723-14-0	17	24
SW6020	Potassium	7440-09-7	17	24
SW6020	Selenium	7782-49-2	17	24
SW6020	Silver	7440-22-4	17	24
SW6020	Sodium	7440-23-5	17	24
SW9030	Sulfide	18496-25-8	17	24
SW6020	Thallium	7440-28-0	17	24
SW6010C	Titanium	7440-32-6	17	24
SW9012A	Total Cyanide	57-12-5	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
SW6020	Vanadium	7440-62-2	17	24
SW6020	Zinc	7440-66-6	17	24
PAHs				
SW8270SIM	1-Methylnaphthalene	90-12-0	17	24
SW8270SIM	2-Methylnaphthalene	91-57-6	17	24
SW8270SIM	Acenaphthene	83-32-9	17	24
SW8270SIM	Acenaphthylene	208-96-8	17	24
SW8270SIM	Anthracene	120-12-7	17	24
SW8270SIM	Benzo(a)anthracene	56-55-3	17	24
SW8270SIM	Benzo(a)pyrene	50-32-8	17	24
SW8270SIM	Benzo(b)fluoranthene	205-99-2	17	24
SW8270SIM	Benzo(e)pyrene	192-97-2	17	24
SW8270SIM	Benzo(g,h,i)perylene	191-24-2	17	24
SW8270SIM	Benzo(k)fluoranthene	207-08-9	17	24
SW8270SIM	C1-Chrysenes	218-01-9C1	17	24
SW8270SIM	C1-Fluoranthenes/Pyrenes	FLUORPYRC1	17	24
SW8270SIM	C1-Fluorenes	86-73-7C1	17	24
SW8270SIM	C1-Naphthalenes	91-20-3C1	17	24
SW8270SIM	C1-Phenanthrenes/Anthracenes	PHENANTHC1	17	24
SW8270SIM	C2-Chrysenes	218-01-9C2	17	24
SW8270SIM	C2-Fluoranthenes/Pyrenes	FLUORPYRC2	17	24
SW8270SIM	C2-Fluorenes	86-73-7C2	17	24
SW8270SIM	C2-Naphthalenes	91-20-3C2	17	24
SW8270SIM	C2-Phenanthrenes/Anthracenes	PHENANTHC2	17	24
SW8270SIM	C3-Chrysenes	218-01-9C3	17	24
SW8270SIM	C3-Fluoranthenes/Pyrenes	FLUORPYRC3	17	24
SW8270SIM	C3-Fluorenes	86-73-7C3	17	24
SW8270SIM	C3-Naphthalenes	91-20-3C3	17	24
SW8270SIM	C3-Phenanthrenes/Anthracenes	PHENANTHC3	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
SW8270SIM	C4-Chrysenes	218-01-9C4	17	24
SW8270SIM	C4-Naphthalenes	91-20-3C4	17	24
SW8270SIM	C4-Phenanthrenes/Anthracenes	PHENANTHC4	17	24
SW8270SIM	Chrysene	218-01-9	17	24
SW8270SIM	Dibenz(a,h)anthracene	53-70-3	17	24
SW8270SIM	Fluoranthene	206-44-0	17	24
SW8270SIM	Fluorene	86-73-7	17	24
SW8270SIM	Indeno(1,2,3-cd)pyrene	193-39-5	17	24
SW8270SIM	Naphthalene	91-20-3	17	24
SW8270SIM	Perylene	198-55-0	17	24
SW8270SIM	Phenanthrene	85-01-8	17	24
SW8270SIM	Pyrene	129-00-0	17	24
PCB congeners				
E1668A	PCB-1	2051-60-7	17	24
E1668A	PCB-2	2051-61-8	17	24
E1668A	PCB-3	2051-62-9	17	24
E1668A	PCB-4	13029-08-8	17	24
E1668A	PCB-5	16605-91-7	17	24
E1668A	PCB-6	25569-80-6	17	24
E1668A	PCB-7	33284-50-3	17	24
E1668A	PCB-8	34883-43-7	17	24
E1668A	PCB-9	34883-39-1	17	24
E1668A	PCB-10	33146-45-1	17	24
E1668A	PCB-11	2050-67-1	17	24
E1668A	PCB-12/13	PCB-12/13	17	24
E1668A	PCB-14	34883-41-5	17	24
E1668A	PCB-15	2050-68-2	17	24
E1668A	PCB-16	38444-78-9	17	24
E1668A	PCB-17	37680-66-3	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1668A	PCB-18/30	PCB-18/30	17	24
E1668A	PCB-19	38444-73-4	17	24
E1668A	PCB-20/28	PCB-20/28	17	24
E1668A	PCB-21/33	PCB-21/33	17	24
E1668A	PCB-22	38444-85-8	17	24
E1668A	PCB-23	55720-44-0	17	24
E1668A	PCB-24	55702-45-9	17	24
E1668A	PCB-25	55712-37-3	17	24
E1668A	PCB-26/29	PCB-26/29	17	24
E1668A	PCB-27	38444-76-7	17	24
E1668A	PCB-31	16606-02-3	17	24
E1668A	PCB-32	38444-77-8	17	24
E1668A	PCB-34	37680-68-5	17	24
E1668A	PCB-35	37680-69-6	17	24
E1668A	PCB-36	38444-87-0	17	24
E1668A	PCB-37	38444-90-5	17	24
E1668A	PCB-38	53555-66-1	17	24
E1668A	PCB-39	38444-88-1	17	24
E1668A	PCB-40/71	PCB-40/71	17	24
E1668A	PCB-41	52663-59-9	17	24
E1668A	PCB-42	36559-22-5	17	24
E1668A	PCB-43	70362-46-8	17	24
E1668A	PCB-44/47/65	PCB-44/47/65	17	24
E1668A	PCB-45	70362-45-7	17	24
E1668A	PCB-46	41464-47-5	17	24
E1668A	PCB-48	70362-47-9	17	24
E1668A	PCB-49/69	PCB-49/69	17	24
E1668A	PCB-50/53	PCB-50/53	17	24
E1668A	PCB-51	68194-04-7	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1668A	PCB-52	35693-99-3	17	24
E1668A	PCB-54	15968-05-5	17	24
E1668A	PCB-55	74338-24-2	17	24
E1668A	PCB-56	41464-43-1	17	24
E1668A	PCB-57	70424-67-8	17	24
E1668A	PCB-58	41464-49-7	17	24
E1668A	PCB-59/62/75	PCB-59/62/75	17	24
E1668A	PCB-60	33025-41-1	17	24
E1668A	PCB-61/70/74/76	PCB-61/70/74/76	17	24
E1668A	PCB-63	74472-34-7	17	24
E1668A	PCB-64	52663-58-8	17	24
E1668A	PCB-66	32598-10-0	17	24
E1668A	PCB-67	73575-53-8	17	24
E1668A	PCB-68	73575-52-7	17	24
E1668A	PCB-72	41464-42-0	17	24
E1668A	PCB-73	74338-23-1	17	24
E1668A	PCB-77	32598-13-3	17	24
E1668A	PCB-78	70362-49-1	17	24
E1668A	PCB-79	41464-48-6	17	24
E1668A	PCB-80	33284-52-5	17	24
E1668A	PCB-81	70362-50-4	17	24
E1668A	PCB-82	52663-62-4	17	24
E1668A	PCB-83	60145-20-2	17	24
E1668A	PCB-84	52663-60-2	17	24
E1668A	PCB-85/116/117	PCB-85/116/117	17	24
E1668A	PCB-86/87/97/109/119/125	PCB-86/87/97/109/119/125	17	24
E1668A	PCB-88	55215-17-3	17	24
E1668A	PCB-89	73575-57-2	17	24
E1668A	PCB-90/101/113	PCB-90/101/113	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1668A	PCB-91	68194-05-8	17	24
E1668A	PCB-92	52663-61-3	17	24
E1668A	PCB-93/100	PCB-93/100	17	24
E1668A	PCB-94	73575-55-0	17	24
E1668A	PCB-95	38379-99-6	17	24
E1668A	PCB-96	73575-54-9	17	24
E1668A	PCB-98/102	PCB-98/102	17	24
E1668A	PCB-99	38380-01-7	17	24
E1668A	PCB-103	60145-21-3	17	24
E1668A	PCB-104	56558-16-8	17	24
E1668A	PCB-105	32598-14-4	17	24
E1668A	PCB-106	70424-69-0	17	24
E1668A	PCB-107	70424-68-9	17	24
E1668A	PCB-108/124	PCB-108/124	17	24
E1668A	PCB-110/115	PCB-110/115	17	24
E1668A	PCB-111	39635-32-0	17	24
E1668A	PCB-112	74472-36-9	17	24
E1668A	PCB-114	74472-37-0	17	24
E1668A	PCB-118	31508-00-6	17	24
E1668A	PCB-120	68194-12-7	17	24
E1668A	PCB-121	56558-18-0	17	24
E1668A	PCB-122	76842-07-4	17	24
E1668A	PCB-123	65510-44-3	17	24
E1668A	PCB-126	57465-28-8	17	24
E1668A	PCB-127	39635-33-1	17	24
E1668A	PCB-128/166	PCB-128/166	17	24
E1668A	PCB-129/138/163	PCB-129/138/163	17	24
E1668A	PCB-130	52663-66-8	17	24
E1668A	PCB-131	61798-70-7	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1668A	PCB-132	38380-05-1	17	24
E1668A	PCB-133	35694-04-3	17	24
E1668A	PCB-134	52704-70-8	17	24
E1668A	PCB-135/151	PCB-135/151	17	24
E1668A	PCB-136	38411-22-2	17	24
E1668A	PCB-137	35694-06-5	17	24
E1668A	PCB-139/140	PCB-139/140	17	24
E1668A	PCB-141	52712-04-6	17	24
E1668A	PCB-142	41411-61-4	17	24
E1668A	PCB-143	68194-15-0	17	24
E1668A	PCB-144	68194-14-9	17	24
E1668A	PCB-145	74472-40-5	17	24
E1668A	PCB-146	51908-16-8	17	24
E1668A	PCB-147/149	PCB-147/149	17	24
E1668A	PCB-148	74472-41-6	17	24
E1668A	PCB-150	68194-08-1	17	24
E1668A	PCB-152	68194-09-2	17	24
E1668A	PCB-153/168	PCB-153/168	17	24
E1668A	PCB-154	60145-22-4	17	24
E1668A	PCB-155	33979-03-2	17	24
E1668A	PCB-156/157	PCB-156/157	17	24
E1668A	PCB-158	74472-42-7	17	24
E1668A	PCB-159	39635-35-3	17	24
E1668A	PCB-160	41411-62-5	17	24
E1668A	PCB-161	74472-43-8	17	24
E1668A	PCB-162	39635-34-2	17	24
E1668A	PCB-164	74472-45-0	17	24
E1668A	PCB-165	74472-46-1	17	24
E1668A	PCB-167	52663-72-6	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1668A	PCB-169	32774-16-6	17	24
E1668A	PCB-170	35065-30-6	17	24
E1668A	PCB-171/173	PCB-171/173	17	24
E1668A	PCB-172	52663-74-8	17	24
E1668A	PCB-174	38411-25-5	17	24
E1668A	PCB-175	40186-70-7	17	24
E1668A	PCB-176	52663-65-7	17	24
E1668A	PCB-177	52663-70-4	17	24
E1668A	PCB-178	52663-67-9	17	24
E1668A	PCB-179	52663-64-6	17	24
E1668A	PCB-180/193	PCB-180/193	17	24
E1668A	PCB-181	74472-47-2	17	24
E1668A	PCB-182	60145-23-5	17	24
E1668A	PCB-183/185	PCB-183/185	17	24
E1668A	PCB-184	74472-48-3	17	24
E1668A	PCB-186	74472-49-4	17	24
E1668A	PCB-187	52663-68-0	17	24
E1668A	PCB-188	74487-85-7	17	24
E1668A	PCB-189	39635-31-9	17	24
E1668A	PCB-190	41411-64-7	17	24
E1668A	PCB-191	74472-50-7	17	24
E1668A	PCB-192	74472-51-8	17	24
E1668A	PCB-194	35694-08-7	17	24
E1668A	PCB-195	52663-78-2	17	24
E1668A	PCB-196	42740-50-1	17	24
E1668A	PCB-197/200	PCB-197/200	17	24
E1668A	PCB-198/199	PCB-198/199	17	24
E1668A	PCB-201	40186-71-8	17	24
E1668A	PCB-202	2136-99-4	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1668A	PCB-203	52663-76-0	17	24
E1668A	PCB-204	74472-52-9	17	24
E1668A	PCB-205	74472-53-0	17	24
E1668A	PCB-206	40186-72-9	17	24
E1668A	PCB-207	52663-79-3	17	24
E1668A	PCB-208	52663-77-1	17	24
E1668A	PCB-209	2051-24-3	17	24
Pesticides				
E1699	2,4'-DDD	53-19-0	17	24
E1699	2,4'-DDE	3424-82-6	17	24
E1699	2,4'-DDT	789-02-6	17	24
E1699	4,4'-DDD	72-54-8	17	24
E1699	4,4'-DDE	72-55-9	17	24
E1699	4,4'-DDT	50-29-3	17	24
E1699	Aldrin	309-00-2	17	24
E1699	Alpha-BHC	319-84-6	17	24
E1699	Alpha-Chlordane	5103-71-9	17	24
E1699	Beta-BHC	319-85-7	17	24
E1699	Delta-BHC	319-86-8	17	24
E1699	Dieldrin	60-57-1	17	24
E1699	Endosulfan I	959-98-8	17	24
E1699	Endosulfan II	33213-65-9	17	24
E1699	Endosulfan Sulfate	1031-07-8	17	24
E1699	Endrin	72-20-8	17	24
E1699	Endrin Aldehyde	7421-93-4	17	24
E1699	Endrin Ketone	53494-70-5	17	24
E1699	Gamma-BHC (Lindane)	58-89-9	17	24
E1699	Heptachlor	76-44-8	17	24
E1699	Heptachlor Epoxide	1024-57-3	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
E1699	Hexachlorobenzene	118-74-1	17	24
E1699	Methoxychlor	72-43-5	17	24
E1699	Mirex	2385-85-5	17	24
E1699	Nonachlor, trans-	39765-80-5	17	24
E1699	Oxychlordane	27304-13-8	17	24
E1699	cis-Nonachlor	5103-73-1	17	24
E1699	trans-Chlordane	5103-74-2	17	24
E1699	trans-Heptachlor Epoxide	28044-83-9	17	24
SVOCs				
SW8270D	1,2-Diphenylhydrazine	122-66-7	17	24
SW8270D	1,2,4,5-Tetrachlorobenzene	95-94-3	17	24
SW8270D	2-Chloronaphthalene	91-58-7	17	24
SW8270D	2-Chlorophenol	95-57-8	17	24
SW8270D	2-Methylphenol	95-48-7	17	24
SW8270D	2-Nitroaniline	88-74-4	17	24
SW8270D	2-Nitrophenol	88-75-5	17	24
SW8270D	2,2'-oxybis(1-Chloropropane)	108-60-1	17	24
SW8270D	2,3,4,6-Tetrachlorophenol	58-90-2	17	24
SW8270D	2,4-Dichlorophenol	120-83-2	17	24
SW8270D	2,4-Dimethylphenol	105-67-9	17	24
SW8270D	2,4-Dinitrophenol	51-28-5	17	24
SW8270D	2,4-Dinitrotoluene	121-14-2	17	24
SW8270D	2,4,5-Trichlorophenol	95-95-4	17	24
SW8270D	2,4,6-Trichlorophenol	88-06-2	17	24
SW8270D	2,6-Dinitrotoluene	606-20-2	17	24
SW8270D	3-Nitroaniline	99-09-2	17	24
SW8270D	3,3'-Dichlorobenzidine	91-94-1	17	24
SW8270D	4-Bromophenyl phenyl ether	101-55-3	17	24
SW8270D	4-Chloro-3-Methylphenol	59-50-7	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
SW8270D	4-Chloroaniline	106-47-8	17	24
SW8270D	4-Chlorophenyl phenyl ether	7005-72-3	17	24
SW8270D	4-Methylphenol	106-44-5	17	24
SW8270D	4-Nitroaniline	100-01-6	17	24
SW8270D	4-Nitrophenol	100-02-7	17	24
SW8270D	4,6-Dinitro-2-methylphenol	534-52-1	17	24
SW8270D	Acetophenone	98-86-2	17	24
SW8270D	Atrazine	1912-24-9	17	24
SW8270D	Benzaldehyde	100-52-7	17	24
SW8270D	Benzidine	92-87-5	17	24
SW8270D	Benzoic Acid	65-85-0	17	24
SW8270D	Biphenyl	92-52-4	17	24
SW8270D	bis(2-Chloroethoxy)methane	111-91-1	17	24
SW8270D	bis(2-Chloroethyl)ether	111-44-4	17	24
SW8270D	bis(2-Ethylhexyl)phthalate	117-81-7	17	24
SW8270D	Butyl benzyl phthalate	85-68-7	17	24
SW8270D	Caprolactam	105-60-2	17	24
SW8270D	Carbazole	86-74-8	17	24
SW8270D	Di-n-Butylphthalate	84-74-2	17	24
SW8270D	Di-n-Octylphthalate	117-84-0	17	24
SW8270D	Dibenzofuran	132-64-9	17	24
SW8270D	Diethyl phthalate	84-66-2	17	24
SW8270D	Dimethylphthalate	131-11-3	17	24
SW8270D	Hexachlorobutadiene	87-68-3	17	24
SW8270D	Hexachlorocyclopentadiene	77-47-4	17	24
SW8270D	Hexachloroethane	67-72-1	17	24
SW8270D	Isophorone	78-59-1	17	24
SW8270D	N-Nitroso-di-n-propylamine	621-64-7	17	24
SW8270D	N-Nitrosodiphenylamine	86-30-6	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
SW8270D	Nitrobenzene	98-95-3	17	24
SW8270D	Pentachlorophenol	87-86-5	17	24
SW8270D	Phenol	108-95-2	17	24
SW8270D	Pyridine	110-86-1	17	24
TPH				
8015C	2,6,10,14-Tetramethyl Pentadecane	1921-70-6	17	24
8015C	2,6,10,14-Tetramethylhexadecane	638-36-8	17	24
8015C	Dotriacontane	544-85-4	17	24
8015C	Heneicosane	629-94-7	17	24
8015C	Heptacosane	593-49-7	17	24
8015C	Heptadecane	629-78-7	17	24
8015C	Heptatriacontane, -n	7194-84-5	17	24
8015C	Hexatriacontane	630-06-8	17	24
8015C	Hhentriacontane	630-04-6	17	24
8015C	n-Decane	124-18-5	17	24
8015C	n-Docosane	629-97-0	17	24
8015C	n-Dodecane	112-40-3	17	24
8015C	n-Eicosane	112-95-8	17	24
8015C	n-Hexacosane	630-01-3	17	24
8015C	n-Hexadecane	544-76-3	17	24
8015C	n-Nonane	111-84-2	17	24
8015C	n-Octacosane	630-02-4	17	24
8015C	n-Octadecane	593-45-3	17	24
8015C	n-Tetracosane	646-31-1	17	24
8015C	n-Tetradecane	629-59-4	17	24
8015C	n-Triacontane	638-68-6	17	24
8015C	n-Tridecane	629-50-5	17	24
8015C	n-Undecane	1120-21-4	17	24
8015C	Nonacosane	630-03-5	17	24

TABLE 3-1
ACCESSIBLE SURFACE SEDIMENT SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Crab and Clam Sampling Program (a)	SQT & Porewater Sampling Program (a)
8015C	Nonadecane	629-92-5	17	24
8015C	Nonatriacontane	7194-86-7	17	24
8015C	Octatriacontane	7194-85-6	17	24
8015C	Pentacosane	629-99-2	17	24
8015C	Pentadecane	629-62-9	17	24
8015C	Pentatriacontane	630-07-9	17	24
SW8015B	PHC AS GASOLINE	PHCG	17	24
8015C	Tetracontane	4181-95-7	17	24
8015C	Tetratriacontane	14167-59-0	17	24
8015C	Total Petroleum Hydrocarbons (C9-C40)	TPHC9C40	17	24
8015C	Tricosane	638-67-5	17	24
8015C	Tritriacontane	630-05-7	17	24
VOCs				
SW8260B	1,2,4-Trichlorobenzene	120-82-1	17	24
SW8260B	1,2-Dichlorobenzene	95-50-1	17	24
SW8260B	1,3-Dichlorobenzene	541-73-1	17	24
SW8260B	1,4-Dichlorobenzene	106-46-7	17	24

Notes:
CAS - Chemical Abstracts Service
PAH - Polycyclic Aromatic Hydrocarbon
PCB - Polychlorinated Biphenyl
PHC – Petroleum Hydrocarbon
SQT - Sediment Quality Triad
SVOC – Semivolatile Organic Compound
TPH – Total Petroleum Hydrocarbon
VOC – Volatile Organic Compound
(a) Includes one field duplicate.
(b) Data for this congener missing from one sample.

TABLE 3-2
ACCESSIBLE SURFACE SEDIMENT SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Location ID	Sample ID	Sample Depth	Sample Type
Crab and Clam Sampling Program	NB03SED122ACL	NB03SED122A	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED122BCL	NB03SED122B	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED122CCL	NB03SED122C	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED123ACL	NB03SED123A	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED123BCL	NB03SED123B	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED125CL	NB03SED125	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED127ACL	NB03SED127A	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED127BCL	NB03SED127B	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED129CL	NB03SED129	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED130CL	NB03SED130	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED131ACL	NB03SED131A	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED131ACL	NB03SEDDUP-01	0.0-0.5	FD
Crab and Clam Sampling Program	NB03SED131BCL	NB03SED131B	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED132ACL	NB03SED132A	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED133CL	NB03SED133	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED134CL	NB03SED134	0.0-0.5	N
Crab and Clam Sampling Program	NB03SED135CL	NB03SED135	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED136	NB03SED-CHM136	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED140	NB03SED-CHM140	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED142	NB03SED-CHM142	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED143	NB03SED-CHM143	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED145	NB03SED-CHM145	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED149	NB03SED-CHM149	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED155	NB03SED-CHM155	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED160	NB03SED-CHM160	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED161	NB03SED-CHM161	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED164	NB03SED-CHM164	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED166	NB03SED-CHM166	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED167	NB03SED-CHM167	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED168	NB03SED-CHM168	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED168	NB03SED-DUP-01	0.0-0.5	FD
SQT & Porewater Sampling Program	NB03SED169	NB03SED-CHM169	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED170	NB03SED-CHM170	0.0-0.5	N

TABLE 3-2
ACCESSIBLE SURFACE SEDIMENT SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Location ID	Sample ID	Sample Depth	Sample Type
SQT & Porewater Sampling Program	NB03SED171	NB03SED-CHM171	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED172	NB03SED-CHM172	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED173	NB03SED-CHM173	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED174	NB03SED-CHM174	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED175	NB03SED-CHM175	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED176	NB03SED-CHM176	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED177	NB03SED-CHM177	0.0-0.5	N
SQT & Porewater Sampling Program	NB03SED178	NB03SED-CHM178	0.0-0.5	N

Notes:
COPC - Chemical of Potential Concern
FD - Field Duplicate
N - Normal Sample
SQT - Sediment Quality Triad

TABLE 3-3
SURFACE WATER SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	CWCM - Small Volume N02 Routine Event August 2011	CWCM - Small Volume N03 Routine Event February 2012	CWCM - Small Volume N04 High Flow Event February-March 2013	CWCM - Small Volume N05 Routine Event March 2012	CWCM - Small Volume N06 Routine Event June 2012	CWCM - Small Volume N07 Routine Event December 2012	CWCM - Small Volume N09 High Flow Event June 2013	Total Number of Samples by Event and Method	Total Number of Samples (a)
Butyltins											
KRONE	Dibutyltin	14488-53-0	16		19	19		20		74	74
KRONE	Monobutyltin	78763-54-9	16		19	19		20		74	74
KRONE	Tetrabutyltin	1461-25-2	16		19	19		20		74	74
KRONE	Tri-n-butyltin hydride	688-73-3	16			19				35	35
KRONE	Tributyltin cation	36643-28-4			19			20		39	39
Dioxins-Furans											
SW1613B	1,2,3,4,6,7,8-HpCDD	35822-46-9	16	19	19	19		20	19	112	112
SW1613B	1,2,3,4,6,7,8-HpCDF	67562-39-4	16	19	19	19		20	19	112	112
SW1613B	1,2,3,4,7,8,9-HpCDF	55673-89-7	16	19	19	19		20	19	112	112
SW1613B	1,2,3,4,7,8-HxCDD	39227-28-6	16	19	19	19		20	19	112	112
SW1613B	1,2,3,4,7,8-HxCDF	70648-26-9	16	19	19	19		20	19	112	112
SW1613B	1,2,3,6,7,8-HxCDD	57653-85-7	16	19	19	19		20	19	112	112
SW1613B	1,2,3,6,7,8-HxCDF	57117-44-9	16	19	19	19		20	19	112	112
SW1613B	1,2,3,7,8,9-HxCDD	19408-74-3	16	19	19	19		20	19	112	112
SW1613B	1,2,3,7,8,9-HxCDF	72918-21-9	16	19	19	19		20	19	112	112
SW1613B	1,2,3,7,8-PCDD	40321-76-4	16	19	19	19		20	19	112	112
SW1613B	1,2,3,7,8-PCDF	57117-41-6	16	19	19	19		20	19	112	112
SW1613B	2,3,4,6,7,8-HxCDF	60851-34-5	16	19	19	19		20	19	112	112
SW1613B	2,3,4,7,8-PCDF	57117-31-4	16	19	19	19		20	19	112	112
SW1613B	2,3,7,8-TCDD	1746-01-6	16	19	19	19		20	19	112	112
SW1613B	2,3,7,8-TCDF	51207-31-9	16	19	19	19		20	19	112	112
SW1613B	Dioxin-Furan TEQ	KMTEQDF	16	19	19	19		20	19	112	112
SW1613B	OCDD	3268-87-9	16	19	19	19		20	19	112	112
SW1613B	OCDF	39001-02-0	16	19	19	19		20	19	112	112
Metals											
SW6010	Aluminum	7429-90-5	16		19	19		20		74	74
SW6020	Antimony	7440-36-0	16		19	19		20		74	74
E200.8	Arsenic	7440-38-2	9		19	19		20		67	74
SW6020	Arsenic	7440-38-2	7							7	
SW6010	Barium	7440-39-3	16		19	19		20		74	74
E200.8	Beryllium	7440-41-7	9		19	19		20		67	74
SW6020	Beryllium	7440-41-7	7							7	
E200.8	Cadmium	7440-43-9	9	19	19	19	19	20	19	124	131
SW6020	Cadmium	7440-43-9	7							7	
SW6010	Calcium	7440-70-2	16		19	19		20		74	74
E200.8	Chromium	7440-47-3	9		19	19		20		67	74
SW6020	Chromium	7440-47-3	7							7	
218.6	Chromium, Hexavalent	18540-29-9	16		18	19		20		73	73
E200.8	Cobalt	7440-48-4	9		19	19		20		67	74
SW6020	Cobalt	7440-48-4	7							7	
E200.8	Copper	7440-50-8	9	19	19	19	19	20	19	124	131
SW6020	Copper	7440-50-8	7							7	
E335.4	Cyanide	57-12-5	16		19	19		20		74	74
SW6010	Iron	7439-89-6	16		19	19		20		74	74
E200.8	Lead	7439-92-1	9	19	19	19	19	20	19	124	131
SW6020	Lead	7439-92-1	7							7	
SW6010	Magnesium	7439-95-4	16		19	19		20		74	74
SW6010	Manganese	7439-96-5	16		19	19		20		74	74
E1631E	Mercury	7439-97-6	16	19	19	19	19	20	19	131	131
E1630	Methyl Mercury	22967-92-6	16		19	19		20		74	74
E200.8	Nickel	7440-02-0	9		19	19		20		67	74
SW6020	Nickel	7440-02-0	7							7	
E365.3	Phosphorus, Dissolved (as P)	7723-14-0	16		19	19		20		74	74
SW6010	Potassium	7440-09-7	16		19	19		20		74	74

TABLE 3-3
SURFACE WATER SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	CWCM - Small Volume N02 Routine Event August 2011	CWCM - Small Volume N03 Routine Event February 2012	CWCM - Small Volume N04 High Flow Event February-March 2013	CWCM - Small Volume N05 Routine Event March 2012	CWCM - Small Volume N06 Routine Event June 2012	CWCM - Small Volume N07 Routine Event December 2012	CWCM - Small Volume N09 High Flow Event June 2013	Total Number of Samples by Event and Method	Total Number of Samples (a)
SW7742	Selenium	7782-49-2	16		19	19		20		74	74
E200.8	Silver	7440-22-4	9		19	19		20		67	74
SW6020	Silver	7440-22-4	7							7	
SW6010	Sodium	7440-23-5	16		19	19		20		74	74
E200.8	Thallium	7440-28-0	9		19	19		20		67	74
SW6020	Thallium	7440-28-0	7							7	
SW6010	Titanium	7440-32-6	16		19	19		20		74	74
SW6010	Vanadium	7440-62-2	16		19	19		20		74	74
E200.8	Zinc	7440-66-6	9		19	19		20		67	74
SW6020	Zinc	7440-66-6	7							7	
PAHs											
ID-0016	1-Methylnaphthalene	90-12-0	15		19	19		20		73	73
ID-0016	1-Methylphenanthrene	832-69-9	15		19	19		20		73	73
ID-0016	1,6,7-Trimethylnapthalene	2245-38-7	15		19	19		20		73	73
ID-0016	2-Methylnaphthalene	91-57-6	15		19	19		20		73	74
SW8270 LL	2-Methylnaphthalene	91-57-6	1							1	
ID-0016	2,6-Dimethylnapthalene	581-42-0	15		19	19		20		73	73
ID-0016	Acenaphthene	83-32-9	15		19	19		20		73	74
SW8270 LL	Acenaphthene	83-32-9	1							1	
ID-0016	Acenaphthylene	208-96-8	15		19	19		20		73	74
SW8270 LL	Acenaphthylene	208-96-8	1							1	
ID-0016	Anthracene	120-12-7	15		19	19		20		73	74
SW8270 LL	Anthracene	120-12-7	1							1	
ID-0016	Benzanthracene	56-55-3	15		19	19		20		73	74
SW8270 LL	Benzanthracene	56-55-3	1							1	
ID-0016	Benzo(a)pyrene	50-32-8	15		19	19		20		73	74
SW8270 LL	Benzo(a)pyrene	50-32-8	1							1	
ID-0016	Benzo(b)fluoranthene	205-99-2	15		19	19		20		73	74
SW8270 LL	Benzo(b)fluoranthene	205-99-2	1							1	
ID-0016	Benzo(g,h,i)perylene	191-24-2	15		19	19		20		73	74
SW8270 LL	Benzo(g,h,i)perylene	191-24-2	1							1	
ID-0016	Benzo(k)fluoranthene	207-08-9	15		19	19		20		73	74
SW8270 LL	Benzo(k)fluoranthene	207-08-9	1							1	
ID-0016	Benzo[e]pyrene	192-97-2	15		19	19		20		73	73
ID-0016	C1-Benzanthracenes/Chrysenes	BACC1	15		19	19		20		73	73
ID-0016	C1-Dibenzothiophenes	DBTC1	15		19	19		20		73	73
ID-0016	C1-Fluoranthenes/Pyrenes	FANT/PYRC1	15			19				34	34
ID-0016	C1-Fluorenes	FLRC1	15		19	19		20		73	73
ID-0016	C1-Phenanthrenes/Anthracenes	PATAC1	15		19	19		20		73	73
ID-0016	C1-Pyrene/fluoranthenes	PFLAC1			19			20		39	39
ID-0016	C2-Benzanthracenes/Chrysenes	BACC2	15		19	19		20		73	73
ID-0016	C2-Dibenzothiophenes	DBTC2	15		19	19		20		73	73
ID-0016	C2-Fluorenes	FLRC2	15		19	19		20		73	73
ID-0016	C2-Naphthalenes	NPHC2	15		19	19		20		73	73
ID-0016	C2-Phenanthrenes/Anthracenes	PATAC2	15		19	19		20		73	73
ID-0016	C3-Benzanthracenes/Chrysenes	BACC3	15		19	19		20		73	73
ID-0016	C3-Dibenzothiophenes	DBTC3	15		19	19		20		73	73
ID-0016	C3-Fluorenes	FLRC3	15		19	19		20		73	73
ID-0016	C3-Naphthalenes	NPHC3	15		19	19		20		73	73
ID-0016	C3-Phenanthrenes/Anthracenes	PATAC3	15		19	19		20		73	73
ID-0016	C4-Benzanthracenes/Chrysenes	BACC4	15		19	19		20		73	73
ID-0016	C4-Dibenzothiophenes	DBTC4	15		19	19		20		73	73
ID-0016	C4-Naphthalenes	NPHC4	15		19	19		20		73	73
ID-0016	C4-Phenanthrenes/Anthracenes	PATAC4	15		19	19		20		73	73

TABLE 3-3
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ID-0016	Chrysene	218-01-9	15		19	19		20		73	74
SW8270 LL	Chrysene	218-01-9	1							1	
ID-0016	Dibenz(a,h)anthracene	53-70-3	15		19	19		20		73	74
SW8270 LL	Dibenz(a,h)anthracene	53-70-3	1							1	
ID-0016	Dibenzothiophene (Synfuel)	132-65-0	15		19	19		20		73	73
ID-0016	Fluoranthene	206-44-0	15		19	19		20		73	74
SW8270 LL	Fluoranthene	206-44-0	1							1	
ID-0016	Fluorene	86-73-7	15		19	19		20		73	74
SW8270 LL	Fluorene	86-73-7	1							1	
ID-0016	Indeno(1,2,3-c,d)pyrene	193-39-5	15		19	19		20		73	74
SW8270 LL	Indeno(1,2,3-c,d)pyrene	193-39-5	1							1	
ID-0016	Naphthalene	91-20-3	15		19	19		20		73	74
SW8270 LL	Naphthalene	91-20-3	1							1	
ID-0016	Perylene	198-55-0	15		19	19		20		73	73
ID-0016	Phenanthrene	85-01-8	15		19	19		20		73	74
SW8270 LL	Phenanthrene	85-01-8	1							1	
ID-0016	Pyrene	129-00-0	15		19	19		20		73	74
SW8270 LL	Pyrene	129-00-0	1							1	
PCBs											
E1668A	PCB-1	2051-60-7	16	19	19	19		20	19	112	112
E1668A	PCB-2	2051-61-8	16	19	19	19		20	19	112	112
E1668A	PCB-3	2051-62-9	16	19	19	19		20	19	112	112
E1668A	PCB-4	13029-08-8	16	19	19	19		20	19	112	112
E1668A	PCB-5	16605-91-7	16	19	19	19		20	19	112	112
E1668A	PCB-6	25569-80-6	16	19	19	19		20	19	112	112
E1668A	PCB-7	33284-50-3	16	19	19	19		20	19	112	112
E1668A	PCB-8	34883-43-7	16	19	19	19		20	19	112	112
E1668A	PCB-9	34883-39-1	16	19	19	19		20	19	112	112
E1668A	PCB-10	33146-45-1	16	19	19	19		20	19	112	112
E1668A	PCB-11	2050-67-1	16	19	19	19		20	19	112	112
E1668A	PCB-12/13	PCB-12/13	16	19	19	19		20	19	112	112
E1668A	PCB-14	34883-41-5	16	19	19	19		20	19	112	112
E1668A	PCB-15	2050-68-2	16	19	19	19		20	19	112	112
E1668A	PCB-16	38444-78-9	16	19	19	19		20	19	112	112
E1668A	PCB-17	37680-66-3	16	19	19	19		20	19	112	112
E1668A	PCB-18/30	PCB-18/30	16	19	19	19		20	19	112	112
E1668A	PCB-19	38444-73-4	16	19	19	19		20	19	112	112
E1668A	PCB-20/28	PCB-20/28	16	19	19	19		20	19	112	112
E1668A	PCB-21/33	PCB-21/33	16	19	19	19		20	19	112	112
E1668A	PCB-22	38444-85-8	16	19	19	19		20	19	112	112
E1668A	PCB-23	55720-44-0	16	19	19	19		20	19	112	112
E1668A	PCB-24	55702-45-9	16	19	19	19		20	19	112	112
E1668A	PCB-25	55712-37-3	16	19	19	19		20	19	112	112
E1668A	PCB-26/29	PCB-26/29	16	19	19	19		20	19	112	112
E1668A	PCB-27	38444-76-7	16	19	19	19		20	19	112	112
E1668A	PCB-31	16606-02-3	16	19	19	19		20	19	112	112
E1668A	PCB-32	38444-77-8	16	19	19	19		20	19	112	112
E1668A	PCB-34	37680-68-5	16	19	19	19		20	19	112	112
E1668A	PCB-35	37680-69-6	16	19	19	19		20	19	112	112
E1668A	PCB-36	38444-87-0	16	19	19	19		20	19	112	112
E1668A	PCB-37	38444-90-5	16	19	19	19		20	19	112	112
E1668A	PCB-38	53555-66-1	16	19	19	19		20	19	112	112
E1668A	PCB-39	38444-88-1	16	19	19	19		20	19	112	112
E1668A	PCB-40/41/71	PCB-40/41/71	16	19	19	19		20	19	112	112
E1668A	PCB-42	36559-22-5	16	19	19	19		20	19	112	112

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E1668A	PCB-43/73	PCB-43/73	16	19	19	19		20	19	112	112
E1668A	PCB-44/47/65	PCB-44/47/65	16	19	19	19		20	19	112	112
E1668A	PCB-45/51	PCB-45/51	16	19	19	19		20	19	112	112
E1668A	PCB-46	41464-47-5	16	19	19	19		20	19	112	112
E1668A	PCB-48	70362-47-9	16	19	19	19		20	19	112	112
E1668A	PCB-49/69	PCB-49/69	16	19	19	19		20	19	112	112
E1668A	PCB-50/53	PCB-50/53	16	19	19	19		20	19	112	112
E1668A	PCB-52	35693-99-3	16	19	19	19		20	19	112	112
E1668A	PCB-54	15968-05-5	16	19	19	19		20	19	112	112
E1668A	PCB-55	74338-24-2	16	19	19	19		20	19	112	112
E1668A	PCB-56	41464-43-1	16	19	19	19		20	19	112	112
E1668A	PCB-57	70424-67-8	16	19	19	19		20	19	112	112
E1668A	PCB-58	41464-49-7	16	19	19	19		20	19	112	112
E1668A	PCB-59/62/75	PCB-59/62/75	16	19	19	19		20	19	112	112
E1668A	PCB-60	33025-41-1	16	19	19	19		20	19	112	112
E1668A	PCB-61/70/74/76	PCB-61/70/74/76	16	19	19	19		20	19	112	112
E1668A	PCB-63	74472-34-7	16	19	19	19		20	19	112	112
E1668A	PCB-64	52663-58-8	16	19	19	19		20	19	112	112
E1668A	PCB-66	32598-10-0	16	19	19	19		20	19	112	112
E1668A	PCB-67	73575-53-8	16	19	19	19		20	19	112	112
E1668A	PCB-68	73575-52-7	16	19	19	19		20	19	112	112
E1668A	PCB-72	41464-42-0	16	19	19	19		20	19	112	112
E1668A	PCB-77	32598-13-3	16	19	19	19		20	19	112	112
E1668A	PCB-78	70362-49-1	16	19	19	19		20	19	112	112
E1668A	PCB-79	41464-48-6	16	19	19	19		20	19	112	112
E1668A	PCB-80	33284-52-5	16	19	19	19		20	19	112	112
E1668A	PCB-81	70362-50-4	16	19	19	19		20	19	112	112
E1668A	PCB-82	52663-62-4	16	19	19	19		20	19	112	112
E1668A	PCB-83/99	PCB-83/99	16	19	19	19		20	19	112	112
E1668A	PCB-84	52663-60-2	16	19	19	19		20	19	112	112
E1668A	PCB-85/116/117	PCB-85/116/117	16	19	19	19		20	19	112	112
E1668A	PCB-86/87/97/109/119/125	PCB-86/87/97/109/119/125	16	19	19	19		20	19	112	112
E1668A	PCB-88/91	PCB-88/91	16	19	19	19		20	19	112	112
E1668A	PCB-89	73575-57-2	16	19	19	19		20	19	112	112
E1668A	PCB-90/101/113	PCB-90/101/113	16	19	19	19		20	19	112	112
E1668A	PCB-92	52663-61-3	16	19	19	19		20	19	112	112
E1668A	PCB-93/100	PCB-93/100	16	19	19	19		20	19	112	112
E1668A	PCB-94	73575-55-0	16	19	19	19		20	19	112	112
E1668A	PCB-95	38379-99-6	16	19	19	19		20	19	112	112
E1668A	PCB-96	73575-54-9	16	19	19	19		20	19	112	112
E1668A	PCB-98/102	PCB-98/102	16	19	19	19		20	19	112	112
E1668A	PCB-103	60145-21-3	16	19	19	19		20	19	112	112
E1668A	PCB-104	56558-16-8	16	19	19	19		20	19	112	112
E1668A	PCB-105	32598-14-4	16	19	19	19		20	19	112	112
E1668A	PCB-106	70424-69-0	16	19	19	19		20	19	112	112
E1668A	PCB-107	70424-68-9	16	19	19	19		20	19	112	112
E1668A	PCB-108/124	PCB-108/124	16	19	19	19		20	19	112	112
E1668A	PCB-110/115	PCB-110/115	16	19	19	19		20	19	112	112
E1668A	PCB-111	39635-32-0	16	19	19	19		20	19	112	112
E1668A	PCB-112	74472-36-9	16	19	19	19		20	19	112	112
E1668A	PCB-114	74472-37-0	16	19	19	19		20	19	112	112
E1668A	PCB-118	31508-00-6	16	19	19	19		20	19	112	112
E1668A	PCB-120	68194-12-7	16	19	19	19		20	19	112	112
E1668A	PCB-121	56558-18-0	16	19	19	19		20	19	112	112
E1668A	PCB-122	76842-07-4	16	19	19	19		20	19	112	112

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E1668A	PCB-123	65510-44-3	16	19	19	19		20	19	112	112
E1668A	PCB-126	57465-28-8	16	19	19	19		20	19	112	112
E1668A	PCB-127	39635-33-1	16	19	19	19		20	19	112	112
E1668A	PCB-128/166	PCB-128/166	16	19	19	19		20	19	112	112
E1668A	PCB-129/138/160/163	PCB-129/138/160/163	16	19	19	19		20	19	112	112
E1668A	PCB-130	52663-66-8	16	19	19	19		20	19	112	112
E1668A	PCB-131	61798-70-7	16	19	19	19		20	19	112	112
E1668A	PCB-132	38380-05-1	16	19	19	19		20	19	112	112
E1668A	PCB-133	35694-04-3	16	19	19	19		20	19	112	112
E1668A	PCB-134/143	PCB-134/143	16	19	19	19		20	19	112	112
E1668A	PCB-135/151	PCB-135/151	16	19	19	19		20	19	112	112
E1668A	PCB-136	38411-22-2	16	19	19	19		20	19	112	112
E1668A	PCB-137	35694-06-5	16	19	19	19		20	19	112	112
E1668A	PCB-139/140	PCB-139/140	16	19	19	19		20	19	112	112
E1668A	PCB-141	52712-04-6	16	19	19	19		20	19	112	112
E1668A	PCB-142	41411-61-4	16	19	19	19		20	19	112	112
E1668A	PCB-144	68194-14-9	16	19	19	19		20	19	112	112
E1668A	PCB-145	74472-40-5	16	19	19	19		20	19	112	112
E1668A	PCB-146	51908-16-8	16	19	19	19		20	19	112	112
E1668A	PCB-147/149	PCB-147/149	16	19	19	19		20	19	112	112
E1668A	PCB-148	74472-41-6	16	19	19	19		20	19	112	112
E1668A	PCB-150	68194-08-1	16	19	19	19		20	19	112	112
E1668A	PCB-152	68194-09-2	16	19	19	19		20	19	112	112
E1668A	PCB-153/168	PCB-153/168	16	19	19	19		20	19	112	112
E1668A	PCB-154	60145-22-4	16	19	19	19		20	19	112	112
E1668A	PCB-155	33979-03-2	16	19	19	19		20	19	112	112
E1668A	PCB-156/157	PCB-156/157	16	19	19	19		20	19	112	112
E1668A	PCB-158	74472-42-7	16	19	19	19		20	19	112	112
E1668A	PCB-159	39635-35-3	16	19	19	19		20	19	112	112
E1668A	PCB-161	74472-43-8	16	19	19	19		20	19	112	112
E1668A	PCB-162	39635-34-2	16	19	19	19		20	19	112	112
E1668A	PCB-164	74472-45-0	16	19	19	19		20	19	112	112
E1668A	PCB-165	74472-46-1	16	19	19	19		20	19	112	112
E1668A	PCB-167	52663-72-6	16	19	19	19		20	19	112	112
E1668A	PCB-169	32774-16-6	16	19	19	19		20	19	112	112
E1668A	PCB-170	35065-30-6	16	19	19	19		20	19	112	112
E1668A	PCB-171/173	PCB-171/173	16	19	19	19		20	19	112	112
E1668A	PCB-172	52663-74-8	16	19	19	19		20	19	112	112
E1668A	PCB-174	38411-25-5	16	19	19	19		20	19	112	112
E1668A	PCB-175	40186-70-7	16	19	19	19		20	19	112	112
E1668A	PCB-176	52663-65-7	16	19	19	19		20	19	112	112
E1668A	PCB-177	52663-70-4	16	19	19	19		20	19	112	112
E1668A	PCB-178	52663-67-9	16	19	19	19		20	19	112	112
E1668A	PCB-179	52663-64-6	16	19	19	19		20	19	112	112
E1668A	PCB-180/193	PCB-180/193	16	19	19	19		20	19	112	112
E1668A	PCB-181	74472-47-2	16	19	19	19		20	19	112	112
E1668A	PCB-182	60145-23-5	16	19	19	19		20	19	112	112
E1668A	PCB-183/185	PCB-183/185	16	19	19	19		20	19	112	112
E1668A	PCB-184	74472-48-3	16	19	19	19		20	19	112	112
E1668A	PCB-186	74472-49-4	16	19	19	19		20	19	112	112
E1668A	PCB-187	52663-68-0	16	19	19	19		20	19	112	112
E1668A	PCB-188	74487-85-7	16	19	19	19		20	19	112	112
E1668A	PCB-189	39635-31-9	16	19	19	19		20	19	112	112
E1668A	PCB-190	41411-64-7	16	19	19	19		20	19	112	112
E1668A	PCB-191	74472-50-7	16	19	19	19		20	19	112	112

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E1668A	PCB-192	74472-51-8	16	19	19	19		20	19	112	112
E1668A	PCB-194	35694-08-7	16	19	19	19		20	19	112	112
E1668A	PCB-195	52663-78-2	16	19	19	19		20	19	112	112
E1668A	PCB-196	42740-50-1	16	19	19	19		20	19	112	112
E1668A	PCB-197	33091-17-7	16	19	19	19		20	19	112	112
E1668A	PCB-198/199	PCB-198/199	16	19	19	19		20	19	112	112
E1668A	PCB-200	52663-73-7	16	19	19	19		20	19	112	112
E1668A	PCB-201	40186-71-8	16	19	19	19		20	19	112	112
E1668A	PCB-202	2136-99-4	16	19	19	19		20	19	112	112
E1668A	PCB-203	52663-76-0	16	19	19	19		20	19	112	112
E1668A	PCB-204	74472-52-9	16	19	19	19		20	19	112	112
E1668A	PCB-205	74472-53-0	16	19	19	19		20	19	112	112
E1668A	PCB-206	40186-72-9	16	19	19	19		20	19	112	112
E1668A	PCB-207	52663-79-3	16	19	19	19		20	19	112	112
E1668A	PCB-208	52663-77-1	16	19	19	19		20	19	112	112
E1668A	PCB-209	2051-24-3	16	19	19	19		20	19	112	112
E1668A	Total non-DLC PCB	PCB-nonDLC	16	19	19	19		20	19	112	112
E1668A	Total PCB	PCB-Total	16	19	19	19		20	19	112	112
E1668A	PCB TEQ	KMTEQPCB	16	19	19	19		20	19	112	112
Pesticides											
USEPA 1699 MOD	Aldrin	309-00-2	16		19	19		20		74	74
USEPA 1699 MOD	Dieldrin	60-57-1	16		19	19		20		74	74
USEPA 1699 MOD	Endosulfan sulfate	1031-07-8	16		19	19		20		74	74
USEPA 1699 MOD	Endrin	72-20-8	16		19	19		20		74	74
USEPA 1699 MOD	Endrin aldehyde	7421-93-4	16		19	19		20		74	74
USEPA 1699 MOD	Endrin ketone	53494-70-5	16		19	19		20		74	74
USEPA 1699 MOD	Heptachlor	76-44-8	16		19	19		20		74	74
USEPA 1699 MOD	Heptachlor epoxide	1024-57-3	16		19	19		20		74	74
USEPA 1699 MOD	Hexachlorobenzene	118-74-1	16		19	19		20		74	74
USEPA 1699 MOD	Methoxychlor	72-43-5	16		19	19		20		74	74
USEPA 1699 MOD	Oxychlordane	27304-13-8	16		19	19		20		74	74
USEPA 1699 MOD	alpha-Chlordane	5103-71-9	16		19	19		20		74	74
USEPA 1699 MOD	alpha-Endosulfan	959-98-8	16		19	19		20		74	74
USEPA 1699 MOD	alpha-Hexachlorocyclohexane (alpha BHC)	319-84-6	16		19	19		20		74	74
USEPA 1699 MOD	beta-Chlordane	5103-74-2	16		19	19		20		74	74
USEPA 1699 MOD	beta-Endosulfan	33213-65-9	16		19	19		20		74	74
USEPA 1699 MOD	beta-Hexachlorocyclohexane (beta BHC)	319-85-7	16		19	19		20		74	74
USEPA 1699 MOD	cis-Nonachlor	5103-73-1	16		19	19		20		74	74
USEPA 1699 MOD	delta-Hexachlorocyclohexane (delta BHC)	319-86-8	16		19	19		20		74	74
USEPA 1699 MOD	gamma-BHC (Lindane)	58-89-9	16		19	19		20		74	74
USEPA 1699 MOD	o,p'-DDD	53-19-0	16		19	19		20		74	74
USEPA 1699 MOD	o,p'-DDE	3424-82-6	16		19	19		20		74	74
USEPA 1699 MOD	o,p'-DDT	789-02-6	16		19	19		20		74	74
USEPA 1699 MOD	p,p'-DDD	72-54-8	16		19	19		20		74	74
USEPA 1699 MOD	p,p'-DDE	72-55-9	16		19	19		20		74	74
USEPA 1699 MOD	p,p'-DDT	50-29-3	16		19	19		20		74	74
USEPA 1699 MOD	trans-Nonachlor	39765-80-5	16		19	19		20		74	74
SVOCs											
SW8270 LL	1,1'-Biphenyl	92-52-4	15		19	19		20		73	73
SW8270 LL	1,2,4,5-Tetrachlorobenzene	95-94-3	15		19	19		20		73	73
SW8270 LL	1,4-Dioxane (p-Dioxane)	123-91-1	15		19	19		20		73	73
SW8270 LL	2-Chloronaphthalene	91-58-7	15		19	19		20		73	73
SW8270 LL	2-Chlorophenol	95-57-8	15		19	19		20		73	73
SW8270 LL	2-Methylphenol (o-Cresol)	95-48-7	15		19	19		20		73	73
SW8270 LL	2-Nitroaniline	88-74-4	15		19	19		20		73	73

TABLE 3-3
SURFACE WATER SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	CWCM - Small Volume N02 Routine Event August 2011	CWCM - Small Volume N03 Routine Event February 2012	CWCM - Small Volume N04 High Flow Event February-March 2013	CWCM - Small Volume N05 Routine Event March 2012	CWCM - Small Volume N06 Routine Event June 2012	CWCM - Small Volume N07 Routine Event December 2012	CWCM - Small Volume N09 High Flow Event June 2013	Total Number of Samples by Event and Method	Total Number of Samples (a)
SW8270 LL	2-Nitrophenol	88-75-5	15		19	19		20		73	73
SW8270 LL	2,3,4,6-Tetrachlorophenol	58-90-2	15		19	19		20		73	73
SW8270 LL	2,4-Dichlorophenol	120-83-2	15		19	19		20		73	73
SW8270 LL	2,4-Dimethylphenol	105-67-9	15		19	19		20		73	73
SW8270 LL	2,4-Dinitrophenol	51-28-5	15		19	19		20		73	73
SW8270 LL	2,4-Dinitrotoluene	121-14-2	15		19	19		20		73	73
SW8270 LL	2,4,5-Trichlorophenol	95-95-4	15		19	19		20		73	73
SW8270 LL	2,4,6-Trichlorophenol	88-06-2	15		19	19		20		73	73
SW8270 LL	2,6-Dinitrotoluene	606-20-2	15		19	19		20		73	73
SW8270 LL	3-Nitroaniline	99-09-2	15		19	19		20		73	73
SW8270 LL	3,3'-Dichlorobenzidine	91-94-1	15		19	19		20		73	73
SW8270 LL	4-Bromophenyl phenyl ether	101-55-3	15		19	19		20		73	73
SW8270 LL	4-Chloro-3-methylphenol	59-50-7	15		19	19		20		73	73
SW8270 LL	4-Chloroaniline	106-47-8	15		19	19		20		73	73
SW8270 LL	4-Chlorophenyl phenyl ether	7005-72-3	15		19	19		20		73	73
SW8270 LL	4-Methylphenol (p-Cresol)	106-44-5	15		19	19		20		73	73
SW8270 LL	4-Nitroaniline	100-01-6	15		19	19		20		73	73
SW8270 LL	4-Nitrophenol	100-02-7	15		19	19		20		73	73
SW8270 LL	4,6-Dinitro-2-methylphenol	534-52-1	15		19	19		20		73	73
SW8270 LL	Acetophenone	98-86-2	15		19	19		20		73	73
SW8270 LL	Atrazine	1912-24-9	15		19	19		20		73	73
SW8270 LL	Benzaldehyde	100-52-7	15		19	19		20		73	73
SW8270 LL	Benzyl butyl phthalate	85-68-7	15		19	19		20		73	73
SW8270 LL	Bis(2-chloro-1-methylethyl) ether	108-60-1	15		19	19		20		73	73
SW8270 LL	Bis(2-chloroethoxy) methane	111-91-1	15		19	19		20		73	73
SW8270 LL	Bis(2-chloroethyl) ether (2-Chloroethyl ether)	111-44-4	15		19	19		20		73	73
SW8270 LL	Bis(2-ethylhexyl) phthalate	117-81-7	15		19	19		20		73	73
SW8270 LL	Caprolactam	105-60-2	15		19	19		20		73	73
SW8270 LL	Carbazole	86-74-8	15		19	19		20		73	73
SW8270 LL	Di-n-butyl phthalate	84-74-2	15		19	19		20		73	73
SW8270 LL	Di-n-octylphthalate	117-84-0	15		19	19		20		73	73
SW8270 LL	Dibenzofuran	132-64-9	15		19	19		20		73	73
SW8270 LL	Diethyl phthalate	84-66-2	15		19	19		20		73	73
SW8270 LL	Dimethyl phthalate	131-11-3	15		19	19		20		73	73
SW8270 LL	Hexachlorobutadiene	87-68-3	15		19	19		20		73	73
SW8270 LL	Hexachlorocyclopentadiene	77-47-4	15		19	19		20		73	73
SW8270 LL	Hexachloroethane	67-72-1	15		19	19		20		73	73
SW8270 LL	Isophorone	78-59-1	15		19	19		20		73	73
SW8270 LL	n-Nitrosodi-n-propylamine	621-64-7	15		19	19		20		73	73
SW8270 LL	n-Nitrosodiphenylamine	86-30-6	15		19	19		20		73	73
SW8270 LL	Nitrobenzene	98-95-3	15		19	19		20		73	73
SW8270 LL	Pentachlorophenol	87-86-5	15		19	19		20		73	73
SW8270 LL	Phenol	108-95-2	15		19	19		20		73	73
VOCs											
SW8260C	1,1,1-Trichloroethane	71-55-6	16		19	19		20		74	74
SW8260C	1,1,2,2-Tetrachloroethane	79-34-5	16		19	19		20		74	74
SW8260C	1,1,2-Trichloroethane	79-00-5	16		19	19		20		74	74
SW8260C	1,1-Dichloroethane	75-34-3	16		19	19		20		74	74
SW8260C	1,1-Dichloroethene	75-35-4	16		19	19		20		74	74
SW8260C	1,2,3-Trichlorobenzene	87-61-6	16		19	19		20		74	74
SW8260C	1,2,4-Trichlorobenzene	120-82-1	16		19	19		20		74	74
SW8260C	1,2-Dibromo-3-chloropropane	96-12-8	16		19	19		20		74	74
SW8260C	1,2-Dibromoethane (Ethylene dibromide)	106-93-4	16		19	19		20		74	74
SW8260C	1,2-Dichlorobenzene	95-50-1	16		19	19		20		74	74
SW8260C	1,2-Dichloroethane	107-06-2	16		19	19		20		74	74

TABLE 3-3
SURFACE WATER SAMPLES PER SAMPLING EVENT AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	CWCM - Small Volume N02 Routine Event August 2011	CWCM - Small Volume N03 Routine Event February 2012	CWCM - Small Volume N04 High Flow Event February-March 2013	CWCM - Small Volume N05 Routine Event March 2012	CWCM - Small Volume N06 Routine Event June 2012	CWCM - Small Volume N07 Routine Event December 2012	CWCM - Small Volume N09 High Flow Event June 2013	Total Number of Samples by Event and Method	Total Number of Samples (a)
SW8260C	1,2-Dichloropropane	78-87-5	16		19	19		20		74	74
SW8260C	1,3-Dichlorobenzene	541-73-1	16		19	19		20		74	74
SW8260C	1,4-Dichlorobenzene	106-46-7	16		19	19		20		74	74
SW8260C	2-Hexanone	591-78-6	16		19	19		20		74	74
SW8260C	Acetone	67-64-1	16		19	19		20		74	74
SW8260C	Benzene	71-43-2	16		19	19		20		74	74
SW8260C	Bromochloromethane	74-97-5	16		19	19		20		74	74
SW8260C	Bromodichloromethane	75-27-4	16		19	19		20		74	74
SW8260C	Bromoform	75-25-2	16		19	19		20		74	74
SW8260C	Bromomethane	74-83-9	16		19	19		20		74	74
SW8260C	Carbon disulfide	75-15-0	16		19	19		20		74	74
SW8260C	Carbon tetrachloride	56-23-5	16		19	19		20		74	74
SW8260C	Chlorobenzene	108-90-7	16		19	19		20		74	74
SW8260C	Chloroethane	75-00-3	16		19	19		20		74	74
SW8260C	Chloroform	67-66-3	16		19	19		20		74	74
SW8260C	Chloromethane	74-87-3	16		19	19		20		74	74
SW8260C	Cyclohexane	110-82-7	16		19	19		20		74	74
SW8260C	Dibromochloromethane	124-48-1	16		19	19		20		74	74
SW8260C	Dichlorodifluoromethane (Freon 12)	75-71-8	16		19	19		20		74	74
SW8260C	Ethylbenzene	100-41-4	16		19	19		20		74	74
SW8260C	Isopropylbenzene (Cumene)	98-82-8	16		19	19		20		74	74
SW8260C	Methyl acetate	79-20-9	16		19	19		20		74	74
SW8260C	Methyl ethyl ketone (2-Butanone)	78-93-3	16		19	19		20		74	74
SW8260C	Methyl isobutyl ketone (4-Methyl-2-pentanone)	108-10-1	16		19	19		20		74	74
SW8260C	Methylcyclohexane	108-87-2	16		19	19		20		74	74
SW8260C	Methylene chloride (Dichloromethane)	75-09-2	16		19	19		20		74	74
SW8260C	Styrene	100-42-5	16		19	19		20		74	74
SW8260C	Tetrachloroethylene (PCE)	127-18-4	16		19	19		20		74	74
SW8260C	Toluene	108-88-3	16		19	19		20		74	74
SW8260C	Trichloroethylene (TCE)	79-01-6	16		19	19		20		74	74
SW8260C	Trichlorofluoromethane (Freon 11)	75-69-4	16		19	19		20		74	74
SW8260C	Trichlorotrifluoroethane	26523-64-8	16		19	19		20		74	74
SW8260C	Vinyl chloride	75-01-4	16		19	19		20		74	74
SW8260C	cis-1,2-Dichloroethylene	156-59-2	16		19	19		20		74	74
SW8260C	cis-1,3-Dichloropropene	10061-01-5	16		19	19		20		74	74
SW8260C	m,p-Xylenes	179601-23-1	16		19	19		20		74	74
SW8260C	o-Xylene (1,2-Dimethylbenzene)	95-47-6	16		19	19		20		74	74
SW8260C	tert-Butyl methyl ether (MTBE)	1634-04-4	16		19	19		20		74	74
SW8260C	trans-1,2-Dichloroethene	156-60-5	16		19	19		20		74	74
SW8260C	trans-1,3-Dichloropropene	10061-02-6	16		19	19		20		74	74

Blank cells - Chemical not analyzed in this sampling event
CAS - Chemical Abstracts Service
COPC - Chemical of Potential Concern
CWCM - Chemical Water Column Monitoring
PAH - Polycyclic Aromatic Hydrocarbon
PCB - Polychlorinated Biphenyl
SVOC - Semi-Volatile Organic Compound
VOC - Volatile Organic Compound
(a) Total count reflects all samples included in COPC selection

TABLE 3-4
SURFACE WATER SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Event Code	Event Type	Matrix	Location Code	Sample Name	Date Sampled	Sample Type
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBE	N02-CE01-TNBE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBE	N02-CE02-TNBE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBE	N02-CE03-TNBE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBE	N02-CE04-TNBE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBN	N02-CE01-TNBN-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBN	N02-CE02-TNBN-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBN	N02-CE03-TNBN-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBN	N02-CE04-TNBN-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBS	N02-CE01-TNBS-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBS	N02-CE02-TNBS-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBS	N02-CE03-TNBS-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNBS	N02-CE04-TNBS-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNNE	N02-CE01-TNNE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNNE	N02-CE02-TNNE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNNE	N02-CE03-TNNE-AS	08/18/2011	N
CWCM - Small Volume	N02	Routine Event	Surface Water (shallow)	N02-TNNE	N02-CE04-TNNE-AS	08/18/2011	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBE	N03-CE02-TNBE-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBE	N03-CE03-TNBE-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBN	N03-CE01-TNBN-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBN	N03-CE02-TNBN-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBN	N03-CE03-TNBN-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBN	N03-CE04-TNBN-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBS	N03-CE01-TNBS-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBS	N03-CE02-TNBS-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBS	N03-CE03-TNBS-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNBS	N03-CE04-TNBS-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNE	N03-CE01-TNBE-AS	02/23/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNE	N03-CE01-TNNE-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNE	N03-CE02-TNNE-AS	02/22/2012	N

TABLE 3-4
SURFACE WATER SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Event Code	Event Type	Matrix	Location Code	Sample Name	Date Sampled	Sample Type
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNE	N03-CE03-TNNE-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNE	N03-CE04-TNNE-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNW	N03-CE01-TNNW-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNW	N03-CE02-TNNW-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNW	N03-CE03-TNNW-AS	02/22/2012	N
CWCM - Small Volume	N03	Routine Event	Surface Water (shallow)	N03-TNNW	N03-CE04-TNNW-AS	02/22/2012	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBE	N04-CE11-TNBE-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBE	N04-CE12-TNBE-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBE	N04-CE20-TNBE-AS	02/28/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBE	N04-CE21-TNBE-AS	03/04/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBN	N04-CE11-TNBN-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBN	N04-CE12-TNBN-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBN	N04-CE20-TNBN-AS	02/28/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBN	N04-CE21-TNBN-AS	03/04/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBS	N04-CE11-TNBS-AS	03/13/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBS	N04-CE12-TNBS-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBS	N04-CE20-TNBS-AS	02/28/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNBS	N04-CE21-TNBS-BS	03/04/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNE	N04-CE12-TNNE-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNE	N04-CE20-TNNE-BS	02/28/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNE	N04-CE21-TNNE-BS	03/04/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNW	N04-CE11-TNNW-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNW	N04-CE12-TNNW-AS	02/27/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNW	N04-CE20-TNNW-AS	02/28/2013	N
CWCM - Small Volume	N04	High Flow Event	Surface Water (shallow)	N04-TNNW	N04-CE21-TNNW-AS	03/04/2013	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBE	N05-CE01-TNBE-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBE	N05-CE02-TNBE-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBE	N05-CE03-TNBE-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBN	N05-CE01-TNBN-AS	03/28/2012	N

TABLE 3-4
SURFACE WATER SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Event Code	Event Type	Matrix	Location Code	Sample Name	Date Sampled	Sample Type
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBN	N05-CE02-TNBN-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBN	N05-CE03-TNBN-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBN	N05-CE04-TNBN-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBS	N05-CE01-TNBS-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBS	N05-CE02-TNBS-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBS	N05-CE03-TNBS-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNBS	N05-CE04-TNBS-AS	03/29/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNE	N05-CE01-TNNE-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNE	N05-CE02-TNNE-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNE	N05-CE03-TNNE-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNE	N05-CE04-TNNE-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNW	N05-CE01-TNNW-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNW	N05-CE02-TNNW-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNW	N05-CE03-TNNW-AS	03/28/2012	N
CWCM - Small Volume	N05	Routine Event	Surface Water (shallow)	N05-TNNW	N05-CE04-TNNW-AS	03/28/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-THKN	N06-CE03-TNBE-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBE	N06-CE01-TNBE-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBE	N06-CE02-TNBE-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBN	N06-CE01-TNBN-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBN	N06-CE02-TNBN-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBN	N06-CE03-TNBN-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBN	N06-CE04-TNBN-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBS	N06-CE01-TNBS-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBS	N06-CE02-TNBS-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBS	N06-CE03-TNBS-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNBS	N06-CE04-TNBS-AS	06/07/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNE	N06-CE01-TNNE-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNE	N06-CE02-TNNE-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNE	N06-CE03-TNNE-AS	06/06/2012	N

TABLE 3-4
SURFACE WATER SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Event Code	Event Type	Matrix	Location Code	Sample Name	Date Sampled	Sample Type
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNE	N06-CE04-TNNE-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNW	N06-CE01-TNNW-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNW	N06-CE02-TNNW-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNW	N06-CE03-TNNW-AS	06/06/2012	N
CWCM - Small Volume	N06	Routine Event	Surface Water (shallow)	N06-TNNW	N06-CE04-TNNW-AS	06/06/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBE	N07-CE01-TNBE-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBE	N07-CE02-TNBE-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBE	N07-CE03-TNBE-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBE	N07-CE04-TNBE-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBN	N07-CE01-TNBN-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBN	N07-CE02-TNBN-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBN	N07-CE03-TNBN-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBN	N07-CE04-TNBN-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBS	N07-CE01-TNBS-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBS	N07-CE02-TNBS-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBS	N07-CE03-TNBS-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNBS	N07-CE04-TNBS-AS	12/13/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNE	N07-CE01-TNNE-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNE	N07-CE02-TNNE-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNE	N07-CE03-TNNE-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNE	N07-CE04-TNNE-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNW	N07-CE01-TNNW-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNW	N07-CE02-TNNW-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNW	N07-CE03-TNNW-AS	12/12/2012	N
CWCM - Small Volume	N07	Routine Event	Surface Water (shallow)	N07-TNNW	N07-CE04-TNNW-AS	12/12/2012	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBE	N09-CE11-TNBE-AS	06/08/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBE	N09-CE12-TNBE-AS	06/09/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBE	N09-CE20-TNBE-AS	06/10/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBE	N09-CE21-TNBE-AS	06/21/2013	N

TABLE 3-4
SURFACE WATER SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Program	Event Code	Event Type	Matrix	Location Code	Sample Name	Date Sampled	Sample Type
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBN	N09-CE11-TNBN-AS	06/08/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBN	N09-CE12-TNBN-AS	06/09/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBN	N09-CE20-TNBN-AS	06/10/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBN	N09-CE21-TNBN-AS	06/21/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBS	N09-CE11-TNBS-AS	06/07/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBS	N09-CE12-TNBS-AS	06/09/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBS	N09-CE20-TNBS-AS	06/10/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNBS	N09-CE21-TNBS-AS	06/21/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNE	N09-CE11-TNNE-AS	06/08/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNE	N09-CE20-TNNE-AS	06/10/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNE	N09-CE21-TNNE-AS	06/21/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNW	N09-CE11-TNNW-AS	06/08/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNW	N09-CE12-TNNW-AS	06/09/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNW	N09-CE20-TNNW-AS	06/10/2013	N
CWCM - Small Volume	N09	High Flow Event	Surface Water (shallow)	N09-TNNW	N09-CE21-TNNW-AS	06/21/2013	N

Notes
COPC - Chemical of Potential Concern.
CWCM - Chemical Water Column Monitoring.
N - Normal Sample.
Shallow surface water samples were collected from approximately 3 feet below the water surface.

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
Butyltins									
ORGANOTINS_GC	Dibutyltin	1002-53-5	18	18	21	18	20	37	37
ORGANOTINS_GC	Monobutyltin	2406-65-7	18	18	21	18	20	37	37
ORGANOTINS_GC	Tetrabutyltin	1461-25-2	18	18	21	18	20	37	37
ORGANOTINS_GC	Tributyltin	688-73-3	18	18	21	18	20	37	37
Dioxins-Furans									
E1613B	2,3,7,8-TCDD	1746-01-6	18	18	21	18	20	37	37
E1613B	1,2,3,7,8-PeCDD	40321-76-4	18	18	21	18	20	37	37
E1613B	1,2,3,4,7,8-HxCDD	39227-28-6	18	18	21	18	20	37	37
E1613B	1,2,3,6,7,8-HxCDD	57653-85-7	18	18	21	18	20	37	37
E1613B	1,2,3,7,8,9-HxCDD	19408-74-3	18	18	21	18	20	37	37
E1613B	1,2,3,4,6,7,8-HpCDD	35822-46-9	18	18	21	18	20	37	37
E1613B	OCDD	3268-87-9	18	18	21	18	20	37	37
E1613B	2,3,7,8-TCDF	51207-31-9	18	18	21	18	20	37	37
E1613B	1,2,3,7,8-PeCDF	57117-41-6	18	18	21	18	20	37	37
E1613B	2,3,4,7,8-PeCDF	57117-31-4	18	18	21	18	20	37	37
E1613B	1,2,3,4,7,8-HxCDF	70648-26-9	18	18	21	18	20	37	37
E1613B	1,2,3,6,7,8-HxCDF	57117-44-9	18	18	21	18	20	37	37
E1613B	1,2,3,7,8,9-HxCDF	72918-21-9	18	18	21	18	20	37	37
E1613B	2,3,4,6,7,8-HxCDF	60851-34-5	18	18	21	18	20	37	37
E1613B	1,2,3,4,6,7,8-HpCDF	67562-39-4	18	18	21	18	20	37	37
E1613B	1,2,3,4,7,8,9-HpCDF	55673-89-7	18	18	21	18	20	37	37
E1613B	OCDF	39001-02-0	18	18	21	18	20	37	37
Metals									
SW6020	Aluminum	7429-90-5	18	18	21	18	20	37	36
SW6020	Antimony	7440-36-0	18	18	21	18	20	37	36
SW6020	Arsenic	7440-38-2	18	18	21	18	20	37	36
SW6020	Barium	7440-39-3	18	18	21	18	20	37	36
SW6020	Beryllium	7440-41-7	18	18	21	18	20	37	36
SW6020	Cadmium	7440-43-9	18	18	21	18	20	37	36
SW6020	Calcium	7440-70-2	18	18	21	18	20	37	36
SW6020	Chromium	7440-47-3	18	18	21	18	20	37	36
SW6020	Cobalt	7440-48-4	18	18	21	18	20	37	36
SW6020	Copper	7440-50-8	18	18	21	18	20	37	36
SW6020	Iron	7439-89-6	18	18	21	18	20	37	36
SW6020	Lead	7439-92-1	18	18	21	18	20	37	36
SW6020	Magnesium	7439-95-4	18	18	21	18	20	37	36
SW6020	Manganese	7439-96-5	18	18	21	18	20	37	36
E1631B	Mercury	7439-97-6	18	18	21	18	20	37	37
E1630M	Methyl Mercury	22967-92-6	18	18	21	18	20	37	37
SW6020	Nickel	7440-02-0	18	18	21	18	20	37	36

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
SW6020	Potassium	7440-09-7	18	18	21	18	20	37	36
SW6020	Selenium	7782-49-2	18	18	21	18	20	37	36
SW6020	Silver	7440-22-4	18	18	21	18	20	37	36
SW6020	Sodium	7440-23-5	18	18	21	18	20	37	36
SW6020	Thallium	7440-28-0	18	18	21	18	20	37	36
SW6010C	Titanium	7440-32-6	18	18	21	18	20	37	36
SW6020	Vanadium	7440-62-2	18	18	21	18	20	37	36
SW6020	Zinc	7440-66-6	18	18	21	18	20	37	36
PAHs									
SW8270D SIM	1-Methylnaphthalene	90-12-0	18	18	21	18	20	37	37
SW8270D SIM	2-Methylnaphthalene	91-57-6	18	18	21	18	20	37	37
SW8270D SIM	Acenaphthene	83-32-9	18	18	21	18	20	37	37
SW8270D SIM	Acenaphthylene	208-96-8	18	18	21	18	20	37	37
SW8270D SIM	Anthracene	120-12-7	18	18	21	18	20	37	37
SW8270D SIM	BENZO(J,K)FLUORANTHENE	207-08-9-JK	18	18	21	18	20	37	37
SW8270D SIM	Benzo(a)anthracene	56-55-3	18	18	21	18	20	37	37
SW8270D SIM	Benzo(a)pyrene	50-32-8	18	18	21	18	20	37	37
SW8270D SIM	Benzo(b)fluoranthene	205-99-2	18	18	21	18	20	37	37
SW8270D SIM	Benzo(e)pyrene	192-97-2	18	18	21	18	20	37	37
SW8270D SIM	Benzo(g,h,i)perylene	191-24-2	18	18	21	18	20	37	37
SW8270D SIM	C1-Chrysenes	30037	18	18	21	18	20	37	37
SW8270D SIM	C1-Fluoranthenes/Pyrenes	30039	18	18	21	18	20	37	37
SW8270D SIM	C1-Fluorenes	30040	18	18	21	18	20	37	37
SW8270D SIM	C1-Naphthalenes	30041	18	18	21	18	20	37	37
SW8270D SIM	C1-Phenanthrenes/Anthracenes	30042	18	18	21	18	20	37	37
SW8270D SIM	C2-Chrysenes	30058	18	18	21	18	20	37	37
SW8270D SIM	C2-Fluoranthenes/Pyrenes	30367	18	18	21	18	20	37	37
SW8270D SIM	C2-Fluorenes	30060	18	18	21	18	20	37	37
SW8270D SIM	C2-Naphthalenes	30061	18	18	21	18	20	37	37
SW8270D SIM	C2-Phenanthrene/anthracenes	PHENANTHC2	18	18	21	18	20	37	37
SW8270D SIM	C3-Chrysenes	30068	18	18	21	18	20	37	37
SW8270D SIM	C3-Fluoranthenes/Pyrenes	30368	18	18	21	18	20	37	37
SW8270D SIM	C3-Fluorenes	30070	18	18	21	18	20	37	37
SW8270D SIM	C3-Naphthalene	30071	18	18	21	18	20	37	37
SW8270D SIM	C3-Phenanthrene/anthracenes	PHENANTHC3	18	18	21	18	20	37	37
SW8270D SIM	C4-Chrysenes	30074	18	18	21	18	20	37	37
SW8270D SIM	C4-Naphthalene	30077	18	18	21	18	20	37	37
SW8270D SIM	C4-Phenanthrenes/anthracenes	30078	18	18	21	18	20	37	37
SW8270D SIM	Chrysene	218-01-9	18	18	21	18	20	37	37
SW8270D SIM	Dibenzo(a,h)anthracene	53-70-3	18	18	21	18	20	37	37
SW8270D SIM	Fluoranthene	206-44-0	18	18	21	18	20	37	37

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
SW8270D SIM	Fluorene	86-73-7	18	18	21	18	20	37	37
SW8270D SIM	Indeno(1,2,3-cd)pyrene	193-39-5	18	18	21	18	20	37	37
SW8270D SIM	Naphthalene	91-20-3	18	18	21	18	20	37	37
SW8270D SIM	Perylene	198-55-0	18	18	21	18	20	37	37
SW8270D SIM	Phenanthrene	85-01-8	18	18	21	18	20	37	37
SW8270D SIM	Pyrene	129-00-0	18	18	21	18	20	37	37
PCBs									
E1668A	PCB-1	2051-60-7	18	18	21	18	20	37	37
E1668A	PCB-2	2051-61-8	18	18	21	18	20	37	37
E1668A	PCB-3	2051-62-9	18	18	21	18	20	37	37
E1668A	PCB-4	13029-08-8	18	18	21	18	20	37	37
E1668A	PCB-5	16605-91-7	18	18	21	18	20	37	37
E1668A	PCB-6	25569-80-6	18	18	21	18	20	37	37
E1668A	PCB-7	33284-50-3	18	18	21	18	20	37	37
E1668A	PCB-8	34883-43-7	18	18	21	18	20	37	37
E1668A	PCB-9	34883-39-1	18	18	21	18	20	37	37
E1668A	PCB-10	33146-45-1	18	18	21	18	20	37	37
E1668A	PCB-11	2050-67-1	18	18	21	18	20	37	37
E1668A	PCB-12/13	PCB-12/13	18	18	21	18	20	37	37
E1668A	PCB-14	34883-41-5	18	18	21	18	20	37	37
E1668A	PCB-15	2050-68-2	18	18	21	18	20	37	37
E1668A	PCB-16	38444-78-9	18	18	21	18	20	37	37
E1668A	PCB-17	37680-66-3	18	18	21	18	20	37	37
E1668A	PCB-18/30	PCB-18/30	18	18	21	18	20	37	37
E1668A	PCB-19	38444-73-4	18	18	21	18	20	37	37
E1668A	PCB-20/28	PCB-20/28	18	18	20	18	20	37	37
E1668A	PCB-21/33	PCB-21/33	18	18	21	18	20	37	37
E1668A	PCB-22	38444-85-8	18	18	21	18	20	37	37
E1668A	PCB-23	55720-44-0	18	18	21	18	20	37	37
E1668A	PCB-24	55702-45-9	18	18	21	18	20	37	37
E1668A	PCB-25	55712-37-3	18	18	21	18	20	37	37
E1668A	PCB-26/29	PCB-26/29	18	18	21	18	20	37	37
E1668A	PCB-27	38444-76-7	18	18	21	18	20	37	37
E1668A	PCB-31	16606-02-3	18	18	21	18	20	37	37
E1668A	PCB-32	38444-77-8	18	18	21	18	20	37	37
E1668A	PCB-34	37680-68-5	18	18	21	18	20	37	37
E1668A	PCB-35	37680-69-6	18	18	21	18	20	37	37
E1668A	PCB-36	38444-87-0	18	18	21	18	20	37	37
E1668A	PCB-37	38444-90-5	18	18	21	18	20	37	37
E1668A	PCB-38	53555-66-1	18	18	21	18	20	37	37
E1668A	PCB-39	38444-88-1	18	18	21	18	20	37	37

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
E1668A	PCB-40/71	PCB-40/71	18	18	21	18	20	37	37
E1668A	PCB-41	52663-59-9	18	18	21	18	20	37	37
E1668A	PCB-42	36559-22-5	15	18	19	18	20	37	37
E1668A	PCB-43	70362-46-8	18	18	21	18	20	37	37
E1668A	PCB-44/47/65	PCB-44/47/65	18	18	20	18	20	37	37
E1668A	PCB-45	70362-45-7	18	17	21	18	20	37	37
E1668A	PCB-46	41464-47-5	18	18	21	18	20	37	37
E1668A	PCB-48	70362-47-9	18	18	21	18	20	37	37
E1668A	PCB-49/69	PCB-49/69	16	18	19	17	20	37	37
E1668A	PCB-50/53	PCB-50/53	18	18	21	18	20	37	37
E1668A	PCB-51	68194-04-7	18	18	21	18	20	37	37
E1668A	PCB-52	35693-99-3	18	18	21	18	20	37	37
E1668A	PCB-54	15968-05-5	18	18	21	18	20	37	37
E1668A	PCB-55	74338-24-2	18	18	21	18	20	37	37
E1668A	PCB-56	41464-43-1	18	18	20	18	20	37	37
E1668A	PCB-57	70424-67-8	18	18	21	18	20	37	37
E1668A	PCB-58	41464-49-7	18	18	21	18	20	37	37
E1668A	PCB-59/62/75	PCB-59/62/75	18	18	21	18	20	37	37
E1668A	PCB-60	33025-41-1	14	18	21	18	20	37	37
E1668A	PCB-61/70/74/76	PCB-61/70/74/76	14	18	19	17	20	37	37
E1668A	PCB-63	74472-34-7	18	18	21	18	20	37	37
E1668A	PCB-64	52663-58-8	18	18	20	18	20	37	37
E1668A	PCB-66	32598-10-0	18	18	21	18	20	37	37
E1668A	PCB-67	73575-53-8	18	18	21	18	20	37	37
E1668A	PCB-68	73575-52-7	18	18	21	18	20	37	37
E1668A	PCB-72	41464-42-0	18	18	21	18	20	37	37
E1668A	PCB-73	74338-23-1	18	18	21	18	20	37	37
E1668A	PCB-77	32598-13-3	18	18	21	18	20	15	37
E1668A	PCB-78	70362-49-1	18	18	21	18	20	37	37
E1668A	PCB-79	41464-48-6	18	18	21	18	20	37	37
E1668A	PCB-80	33284-52-5	18	18	21	18	20	37	37
E1668A	PCB-81	70362-50-4	18	18	21	18	20	37	37
E1668A	PCB-82	52663-62-4	18	18	21	18	20	37	37
E1668A	PCB-83	60145-20-2	17	18	21	18	20	37	37
E1668A	PCB-84	52663-60-2	16	18	21	18	20	37	37
E1668A	PCB-85/116/117	PCB-85/116/117	14	18	21	18	20	37	37
E1668A	PCB-86/87/97/109/119/125	PCB-86/87/97/109/119/125	16	18	20	18	20	37	37
E1668A	PCB-88	55215-17-3	18	18	21	18	20	37	37
E1668A	PCB-89	73575-57-2	18	18	21	18	20	37	37
E1668A	PCB-90/101/113	PCB-90/101/113	18	18	21	18	20	37	37
E1668A	PCB-91	68194-05-8	16	18	18	18	20	37	37

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
E1668A	PCB-92	52663-61-3	18	18	21	18	20	37	37
E1668A	PCB-93/100	PCB-93/100	18	18	21	18	20	37	37
E1668A	PCB-94	73575-55-0	18	18	21	18	20	37	37
E1668A	PCB-95	38379-99-6	14	18	17	17	20	34	37
E1668A	PCB-96	73575-54-9	18	18	21	18	20	37	37
E1668A	PCB-98/102	PCB-98/102	18	18	21	18	20	37	37
E1668A	PCB-99	38380-01-7	18	18	20	18	20	37	37
E1668A	PCB-103	60145-21-3	18	18	21	18	20	37	37
E1668A	PCB-104	56558-16-8	18	18	21	18	20	37	37
E1668A	PCB-105	32598-14-4	18	18	19	17	20	37	37
E1668A	PCB-106	70424-69-0	18	18	21	18	20	37	37
E1668A	PCB-107	70424-68-9	18	18	19	18	20	37	37
E1668A	PCB-108/124	PCB-108/124	18	18	21	18	20	37	37
E1668A	PCB-110/115	PCB-110/115	17	17	11	17	20	37	37
E1668A	PCB-111	39635-32-0	18	18	21	18	20	37	37
E1668A	PCB-112	74472-36-9	18	18	21	18	20	37	37
E1668A	PCB-114	74472-37-0	18	18	21	18	20	37	37
E1668A	PCB-118	31508-00-6	18	18	21	18	20	37	37
E1668A	PCB-120	68194-12-7	18	18	21	18	20	37	37
E1668A	PCB-121	56558-18-0	18	18	21	18	20	37	37
E1668A	PCB-122	76842-07-4	18	18	21	18	20	37	37
E1668A	PCB-123	65510-44-3	18	18	21	18	20	37	37
E1668A	PCB-126	57465-28-8	18	18	21	18	20	37	37
E1668A	PCB-127	39635-33-1	18	18	21	18	20	37	37
E1668A	PCB-128/166	PCB-128/166	14	18	20	18	20	37	37
E1668A	PCB-129/138/163	PCB-129/138/163	18	18	21	18	20	37	37
E1668A	PCB-130	52663-66-8	15	18	19	18	20	35	37
E1668A	PCB-131	61798-70-7	18	18	21	18	20	37	37
E1668A	PCB-132	38380-05-1	18	18	12	18	20	37	37
E1668A	PCB-133	35694-04-3	15	18	21	18	20	37	37
E1668A	PCB-134	52704-70-8	17	18	20	18	20	37	37
E1668A	PCB-135/151	PCB-135/151	16	18	14	18	20	37	37
E1668A	PCB-136	38411-22-2	18	18	17	18	20	37	37
E1668A	PCB-137	35694-06-5	14	18	21	18	20	35	37
E1668A	PCB-139/140	PCB-139/140	18	18	21	18	20	37	37
E1668A	PCB-141	52712-04-6	18	18	21	18	20	37	37
E1668A	PCB-142	41411-61-4	18	18	21	18	20	37	37
E1668A	PCB-143	68194-15-0	18	18	21	18	20	37	37
E1668A	PCB-144	68194-14-9	18	18	19	18	20	37	37
E1668A	PCB-145	74472-40-5	18	18	21	18	20	37	37
E1668A	PCB-146	51908-16-8	17	17	13	18	20	24	36

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel- Fillet-skinless	Fish Bluefish- Fillet-with skin	Fish Striped Bass- Fillet-with skin	Fish Summer Flounder- Fillet-with skin	Fish White Perch- Fillet-with skin	Crab Blue Crab- Hepatopancreas	Crab Blue Crab- Muscle
E1668A	PCB-147/149	PCB-147/149	18	18	21	18	20	37	37
E1668A	PCB-148	74472-41-6	18	18	21	18	20	37	37
E1668A	PCB-150	68194-08-1	18	18	21	18	20	37	37
E1668A	PCB-152	68194-09-2	18	18	21	18	20	37	37
E1668A	PCB-153/168	PCB-153/168	18	18	21	18	20	37	37
E1668A	PCB-154	60145-22-4	16	18	16	18	20	35	37
E1668A	PCB-155	33979-03-2	18	18	21	18	20	37	37
E1668A	PCB-156/157	PCB-156/157	14	18	21	18	20	37	37
E1668A	PCB-158	74472-42-7	13	18	20	18	20	37	37
E1668A	PCB-159	39635-35-3	18	18	21	18	20	37	37
E1668A	PCB-160	41411-62-5	18	18	21	18	20	37	37
E1668A	PCB-161	74472-43-8	18	18	21	18	20	37	37
E1668A	PCB-162	39635-34-2	18	18	21	18	20	37	37
E1668A	PCB-164	74472-45-0	17	18	21	18	20	37	37
E1668A	PCB-165	74472-46-1	18	18	21	18	20	37	37
E1668A	PCB-167	52663-72-6	12	18	21	18	20	37	37
E1668A	PCB-169	32774-16-6	18	18	21	18	20	37	37
E1668A	PCB-170	35065-30-6	12	18	18	18	20	37	37
E1668A	PCB-171/173	PCB-171/173	17	18	21	18	20	21	37
E1668A	PCB-172	52663-74-8	18	18	21	18	20	37	37
E1668A	PCB-174	38411-25-5	16	17	12	18	20	36	37
E1668A	PCB-175	40186-70-7	18	18	20	18	20	33	37
E1668A	PCB-176	52663-65-7	18	18	21	18	20	37	37
E1668A	PCB-177	52663-70-4	13	17	11	18	20	16	37
E1668A	PCB-178	52663-67-9	10	17	11	18	20	27	37
E1668A	PCB-179	52663-64-6	17	18	19	18	20	37	37
E1668A	PCB-180/193	PCB-180/193	18	18	20	18	20	37	37
E1668A	PCB-181	74472-47-2	18	18	21	18	20	37	37
E1668A	PCB-182	60145-23-5	18	18	21	18	20	37	37
E1668A	PCB-183/185	PCB-183/185	13	17	11	17	20	19	37
E1668A	PCB-184	74472-48-3	18	18	21	18	20	37	37
E1668A	PCB-186	74472-49-4	18	18	21	18	20	37	37
E1668A	PCB-187	52663-68-0	16	17	11	18	20	12	33
E1668A	PCB-188	74487-85-7	18	18	21	18	20	37	37
E1668A	PCB-189	39635-31-9	18	18	21	18	20	37	37
E1668A	PCB-190	41411-64-7	15	18	21	18	20	37	37
E1668A	PCB-191	74472-50-7	18	18	21	18	20	37	37
E1668A	PCB-192	74472-51-8	18	18	21	18	20	37	37
E1668A	PCB-194	35694-08-7	14	18	19	18	20	37	37
E1668A	PCB-195	52663-78-2	18	18	21	18	20	37	37
E1668A	PCB-196	42740-50-1	17	18	20	18	20	37	37

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
E1668A	PCB-197/200	PCB-197/200	18	18	21	18	20	37	37
E1668A	PCB-198/199	PCB-198/199	15	18	19	18	20	37	37
E1668A	PCB-201	40186-71-8	18	18	21	18	20	37	37
E1668A	PCB-202	2136-99-4	16	18	19	18	20	37	37
E1668A	PCB-203	52663-76-0	14	18	19	18	20	37	37
E1668A	PCB-204	74472-52-9	18	18	21	18	20	37	37
E1668A	PCB-205	74472-53-0	18	18	21	18	20	37	37
E1668A	PCB-206	40186-72-9	16	18	18	18	20	37	37
E1668A	PCB-207	52663-79-3	18	18	21	18	20	37	37
E1668A	PCB-208	52663-77-1	18	18	19	18	20	37	37
E1668A	PCB-209	2051-24-3	18	18	18	18	20	35	37
Pesticides									
E1699	2,4'-DDD	53-19-0	18	18	21	18	20	37	37
E1699	2,4'-DDE	3424-82-6	18	18	21	18	20	37	37
E1699	2,4'-DDT	789-02-6	18	18	21	18	20	37	37
E1699	4,4'-DDD	72-54-8	18	18	21	18	20	37	37
E1699	4,4'-DDE	72-55-9	18	18	21	18	20	37	37
E1699	4,4'-DDT	50-29-3	18	18	21	18	20	37	37
E1699	Aldrin	309-00-2	18	18	21	18	20	37	37
E1699	Alpha-BHC	319-84-6	18	18	21	18	20	37	37
E1699	Alpha-Chlordane	5103-71-9	18	18	21	18	20	37	37
E1699	Beta-BHC	319-85-7	18	18	21	18	20	37	37
E1699	cis-Nonachlor	5103-73-1	18	18	21	18	20	37	37
E1699	Delta-BHC	319-86-8	18	18	21	18	20	37	37
E1699	Dieldrin	60-57-1	18	18	21	18	20	37	37
E1699	Endosulfan I	959-98-8	18	18	21	18	20	37	37
E1699	Endosulfan II	33213-65-9	18	18	21	18	20	37	37
E1699	Endosulfan Sulfate	1031-07-8	18	18	21	18	20	37	37
E1699	Endrin	72-20-8	18	18	21	18	20	37	37
E1699	Endrin Aldehyde	7421-93-4	18	18	21	18	20	37	37
E1699	Endrin Ketone	53494-70-5	18	18	21	18	20	37	37
E1699	Gamma-BHC (Lindane)	58-89-9	18	18	21	18	20	37	37
E1699	Heptachlor	76-44-8	18	18	21	18	20	37	37
E1699	Heptachlor Epoxide	1024-57-3	18	18	21	18	20	37	37
E1699	Hexachlorobenzene	118-74-1	18	18	21	18	20	37	37
E1699	Methoxychlor	72-43-5	18	18	21	18	20	37	37
E1699	Mirex	2385-85-5	18	18	21	18	20	37	37
E1699	Nonachlor, trans-	39765-80-5	18	18	21	18	20	37	37
E1699	Oxychlordane	27304-13-8	18	18	21	18	20	37	37
E1699	trans-Chlordane	5103-74-2	18	18	21	18	20	37	37
E1699	trans-Heptachlor Epoxide	28044-83-9	18	18	21	18	20	37	37

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
SVOCs									
SW8270D	1,2-Diphenylhydrazine	122-66-7	18	18	21	18	20	36	37
SW8270D	1,2,4,5-Tetrachlorobenzene	95-94-3	18	18	21	18	20	36	37
SW8270D	2-Chloronaphthalene	91-58-7	18	18	21	18	20	36	37
SW8270D	2-Chlorophenol	95-57-8	18	18	21	18	20	36	37
SW8270D	2-Methylphenol	95-48-7	18	18	21	18	20	36	37
SW8270D	2-Nitroaniline	88-74-4	18	18	21	18	20	36	37
SW8270D	2-Nitrophenol	88-75-5	18	18	21	18	20	36	37
SW8270D	2,2'-oxybis(1-Chloropropane)	108-60-1	18	18	21	18	20	36	37
SW8270D	2,3,4,6-Tetrachlorophenol	58-90-2	18	18	21	18	20	36	37
SW8270D	2,4-Dichlorophenol	120-83-2	18	18	21	18	20	36	37
SW8270D	2,4-Dimethylphenol	105-67-9	18	18	21	18	20	36	37
SW8270D	2,4-Dinitrophenol	51-28-5	18	18	21	18	20	36	37
SW8270D	2,4-Dinitrotoluene	121-14-2	18	18	21	18	20	36	37
SW8270D	2,4,5-Trichlorophenol	95-95-4	18	18	21	18	20	36	37
SW8270D	2,4,6-Trichlorophenol	88-06-2	18	18	21	18	20	36	37
SW8270D	2,6-Dinitrotoluene	606-20-2	18	18	21	18	20	36	37
SW8270D	3-Nitroaniline	99-09-2	18	18	21	18	20	36	37
SW8270D	3,3'-Dichlorobenzidine	91-94-1	18	18	21	18	20	36	37
SW8270D	4-Bromophenyl phenyl ether	101-55-3	18	18	21	18	20	36	37
SW8270D	4-Chloro-3-Methylphenol	59-50-7	18	18	21	18	20	36	37
SW8270D	4-Chloroaniline	106-47-8	18	18	21	18	20	36	37
SW8270D	4-Chlorophenyl phenyl ether	7005-72-3	18	18	21	18	20	36	37
SW8270D	4-Methylphenol	106-44-5	18	18	21	18	20	36	37
SW8270D	4-Nitroaniline	100-01-6	18	18	21	18	20	36	37
SW8270D	4-Nitrophenol	100-02-7	18	18	21	18	20	36	37
SW8270D	4,6-Dinitro-2-methylphenol	534-52-1	18	18	21	18	20	36	37
SW8270D	Acetophenone	98-86-2	18	18	21	18	20	36	37
SW8270D	Atrazine	1912-24-9	18	18	21	18	20	36	37
SW8270D	Benzaldehyde	100-52-7	18	18	21	18	20	36	37
SW8270D	Benzidine	92-87-5	18	18	21	18	20	36	37
SW8270D	Benzoic Acid	65-85-0	18	18	21	18	20	36	37
SW8270D	Biphenyl	92-52-4	18	18	21	18	20	36	37
SW8270D	bis(2-Chloroethoxy)methane	111-91-1	18	18	21	18	20	36	37
SW8270D	bis(2-Chloroethyl)ether	111-44-4	18	18	21	18	20	36	37
SW8270D	bis(2-Ethylhexyl)phthalate	117-81-7	18	18	21	18	20	36	37
SW8270D	Butyl benzyl phthalate	85-68-7	18	18	21	18	20	36	37
SW8270D	Caprolactam	105-60-2	18	18	21	18	20	36	37
SW8270D	Carbazole	86-74-8	18	18	21	18	20	36	37
SW8270D	Di-n-Butylphthalate	84-74-2	18	18	21	18	20	36	37
SW8270D	Di-n-Octylphthalate	117-84-0	18	18	21	18	20	36	37

TABLE 3-5
FISH AND CRAB SAMPLES PER SPECIES/TISSUE TYPE AND ANALYTICAL METHOD
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Analytical Method	Chemical Name	CAS Number	Fish American Eel-Fillet-skinless	Fish Bluefish-Fillet-with skin	Fish Striped Bass-Fillet-with skin	Fish Summer Flounder-Fillet-with skin	Fish White Perch-Fillet-with skin	Crab Blue Crab-Hepatopancreas	Crab Blue Crab-Muscle
SW8270D	Dibenzofuran	132-64-9	18	18	21	18	20	36	37
SW8270D	Diethyl phthalate	84-66-2	18	18	21	18	20	36	37
SW8270D	Dimethylphthalate	131-11-3	18	18	21	18	20	36	37
SW8270D	Hexachlorobutadiene	87-68-3	18	18	21	18	20	36	37
SW8270D	Hexachlorocyclopentadiene	77-47-4	18	18	21	18	20	36	37
SW8270D	Hexachloroethane	67-72-1	18	18	21	18	20	36	37
SW8270D	Isophorone	78-59-1	18	18	21	18	20	36	37
SW8270D	N-Nitroso-di-n-propylamine	621-64-7	18	18	21	18	20	36	37
SW8270D	N-Nitrosodiphenylamine	86-30-6	18	18	21	18	20	36	37
SW8270D	Nitrobenzene	98-95-3	18	18	21	18	20	36	37
SW8270D	Pentachlorophenol	87-86-5	18	18	21	18	20	36	37
SW8270D	Phenol	108-95-2	18	18	21	18	20	36	37
SW8270D	Pyridine	110-86-1	18	18	21	18	20	36	37

Notes:
CAS - Chemical Abstracts Service.
COPC - Chemical of Potential Concern.
PAH - Polycyclic Aromatic Hydrocarbon.
PCB - Polychlorinated Biphenyl.
SVOC - Semi-Volatile Organic Compound.
VOC - Volatile Organic Compound.

TABLE 3-6
FISH AND CRAB TISSUE SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Matrix	Tissue Type Code	Tissue Type Name	General Location	Specific Location	Sample Code	Date Sampled	Sample Type
American Eel-Fillet-skinless							
Fish	FAE	American Eel-Fillet-skinless	Central		NB03FAEC508	09/29/15	N
Fish	FAE	American Eel-Fillet-skinless	Central		NB03FAEC-COMP01	01/12/16	N
Fish	FAE	American Eel-Fillet-skinless	Central		NB03FAEC-COMP02	01/12/16	N
Fish	FAE	American Eel-Fillet-skinless	Central		NB03FAEC-COMP03	01/12/16	N
Fish	FAE	American Eel-Fillet-skinless	Central		NB03FAEC076	01/13/16	N
Fish	FAE	American Eel-Fillet-skinless	Central		NB03FAEC502	01/13/16	N
Fish	FAE	American Eel-Fillet-skinless	North		NB03FAEN-COMP05	09/29/15	N
Fish	FAE	American Eel-Fillet-skinless	North		NB03FAEN-COMP01	10/01/15	N
Fish	FAE	American Eel-Fillet-skinless	North		NB03FAEN-COMP02	10/01/15	N
Fish	FAE	American Eel-Fillet-skinless	North		NB03FAEN-COMP03	01/12/16	N
Fish	FAE	American Eel-Fillet-skinless	North		NB03FAEN-COMP04	01/12/16	N
Fish	FAE	American Eel-Fillet-skinless	North		NB03FAEN-COMP06	01/12/16	N
Fish	FAE	American Eel-Fillet-skinless	South		NB03FAES018	10/01/15	N
Fish	FAE	American Eel-Fillet-skinless	South		NB03FAES019	10/01/15	N
Fish	FAE	American Eel-Fillet-skinless	South		NB03FAES347	01/13/16	N
Fish	FAE	American Eel-Fillet-skinless	South		NB03FAES364	01/13/16	N
Fish	FAE	American Eel-Fillet-skinless	South		NB03FAES365	01/13/16	N
Fish	FAE	American Eel-Fillet-skinless	South		NB03FAES-COMP01	01/13/16	N
Blue Crab-Hepatopancreas							
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	124	NB03CRB-HEP124	09/08/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	125	NB03CRB-HEP125	08/30/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	126	NB03CRB-HEP126	09/08/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	127	NB03CRB-HEP127	08/30/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C001	NB03CRB-HEP-C001	08/30/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C002	NB03CRB-HEP-C002	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C003	NB03CRB-HEP-C003	08/19/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C004	NB03CRB-HEP-C004	09/08/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C005	NB03CRB-HEP-C005	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C006	NB03CRB-HEP-C006	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C007	NB03CRB-HEP-C007	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	Central	C008	NB03CRB-HEP-C008	08/30/15	N

TABLE 3-6
FISH AND CRAB TISSUE SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Matrix	Tissue Type Code	Tissue Type Name	General Location	Specific Location	Sample Code	Date Sampled	Sample Type
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	122	NB03CRB-HEP122	08/19/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	123	NB03CRB-HEP123	08/24/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	132	NB03CRB-HEP132	08/24/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	133	NB03CRB-HEP133	08/24/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N001	NB03CRB-HEP-N001	08/30/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N002	NB03CRB-HEP-N002	08/30/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N003	NB03CRB-HEP-N003	08/25/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N004	NB03CRB-HEP-N004	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N005	NB03CRB-HEP-N005	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N006	NB03CRB-HEP-N006	08/24/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N007	NB03CRB-HEP-N007	08/24/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	North	N008	NB03CRB-HEP-N008	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	129	NB03CRB-HEP129	08/19/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	130	NB03CRB-HEP130	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	131	NB03CRB-HEP131	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	134	NB03CRB-HEP134	08/24/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S001	NB03CRB-HEP-S001	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S002	NB03CRB-HEP-S002	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S003	NB03CRB-HEP-S003	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S004	NB03CRB-HEP-S004	08/30/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S005	NB03CRB-HEP-S005	09/01/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S006	NB03CRB-HEP-S006	09/08/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S007	NB03CRB-HEP-S007	10/06/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S008	NB03CRB-HEP-S008	08/26/15	N
Crab	CRB-HEP	Blue Crab-Hepatopancreas	South	S009	NB03CRB-HEP-S009	08/24/15	N
Blue Crab-Muscle							
Crab	CRB-MUS	Blue Crab-Muscle	Central	124	NB03CRB-MUS124	09/08/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	125	NB03CRB-MUS125	08/30/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	126	NB03CRB-MUS126	09/08/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	127	NB03CRB-MUS127	08/30/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C001	NB03CRB-MUS-C001	08/19/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C002	NB03CRB-MUS-C002	08/26/15	N

TABLE 3-6
FISH AND CRAB TISSUE SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Matrix	Tissue Type Code	Tissue Type Name	General Location	Specific Location	Sample Code	Date Sampled	Sample Type
Crab	CRB-MUS	Blue Crab-Muscle	Central	C003	NB03CRB-MUS-C003	08/19/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C004	NB03CRB-MUS-C004	09/08/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C005	NB03CRB-MUS-C005	08/26/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C006	NB03CRB-MUS-C006	08/26/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C007	NB03CRB-MUS-C007	09/01/15	N
Crab	CRB-MUS	Blue Crab-Muscle	Central	C008	NB03CRB-MUS-C008	08/30/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	122	NB03CRB-MUS122	08/19/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	123	NB03CRB-MUS123	08/24/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	132	NB03CRB-MUS132	08/24/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	133	NB03CRB-MUS133	08/24/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N001	NB03CRB-MUS-N001	08/25/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N002	NB03CRB-MUS-N002	08/30/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N003	NB03CRB-MUS-N003	08/25/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N004	NB03CRB-MUS-N004	09/01/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N005	NB03CRB-MUS-N005	08/26/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N006	NB03CRB-MUS-N006	08/24/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N007	NB03CRB-MUS-N007	08/24/15	N
Crab	CRB-MUS	Blue Crab-Muscle	North	N008	NB03CRB-MUS-N008	09/08/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	129	NB03CRB-MUS129	08/19/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	130	NB03CRB-MUS130	09/01/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	131	NB03CRB-MUS131	08/26/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	134	NB03CRB-MUS134	08/24/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S001	NB03CRB-MUS-S001	08/26/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S002	NB03CRB-MUS-S002	09/01/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S003	NB03CRB-MUS-S003	09/01/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S004	NB03CRB-MUS-S004	08/30/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S005	NB03CRB-MUS-S005	09/01/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S006	NB03CRB-MUS-S006	09/08/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S007	NB03CRB-MUS-S007	10/06/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S008	NB03CRB-MUS-S008	10/06/15	N
Crab	CRB-MUS	Blue Crab-Muscle	South	S009	NB03CRB-MUS-S009	10/06/15	N

TABLE 3-6
FISH AND CRAB TISSUE SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Matrix	Tissue Type Code	Tissue Type Name	General Location	Specific Location	Sample Code	Date Sampled	Sample Type
Bluefish-Fillet-with skin							
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBL-COMP04	12/01/15	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBL-COMP05	12/01/15	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBL-COMP01	12/10/15	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBL-COMP02	12/10/15	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBL-COMP03	12/10/15	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC468	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC469	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC471	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC475	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC476	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC478	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC479	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	Central		NB03FBLC481	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	North		NB03FBLN404	12/01/15	N
Fish	FBF	Bluefish-Fillet-with skin	North		NB03FBLN405	12/01/15	N
Fish	FBF	Bluefish-Fillet-with skin	North		NB03FBLN406	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	South		NB03FBLS339	01/12/16	N
Fish	FBF	Bluefish-Fillet-with skin	South		NB03FBLS349	01/12/16	N
Striped Bass-Fillet-with skin							
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS320	12/01/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS338	12/01/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS321	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS322	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS323	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS327	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS328	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS329	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS330	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS332	12/10/15	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS331	01/12/16	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS333	01/12/16	N

TABLE 3-6
FISH AND CRAB TISSUE SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Matrix	Tissue Type Code	Tissue Type Name	General Location	Specific Location	Sample Code	Date Sampled	Sample Type
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBDUP-10	01/12/16	FD
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBDUP-11	01/13/16	FD
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS324	01/13/16	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS325	01/13/16	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS334	01/13/16	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS335	01/13/16	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBDUP-12	01/20/16	FD
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS336	01/20/16	N
Fish	FSB	Striped Bass-Fillet-with skin	South		NB03FSBS337	01/20/16	N
Summer Flounder-Fillet-with skin							
Fish	FSF	Summer Flounder-Fillet-with skin	Central		NB03FSFC491	12/01/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	Central		NB03FSFC486	12/10/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	Central		NB03FSFC487	12/10/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	Central		NB03FSFC488	12/10/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	Central		NB03FSFC489	01/20/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	Central		NB03FSFC490	01/20/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	North		NB03FSFN410	12/01/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	North		NB03FSFN409	12/10/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	North		NB03FSFN411	12/10/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	North		NB03FSFN412	12/10/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	North		NB03FSFN407	01/13/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	North		NB03FSFN408	01/13/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	South		NB03FSFS359	12/01/15	N
Fish	FSF	Summer Flounder-Fillet-with skin	South		NB03FSFS351	01/20/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	South		NB03FSFS354	01/20/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	South		NB03FSFS355	01/20/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	South		NB03FSFS356	01/20/16	N
Fish	FSF	Summer Flounder-Fillet-with skin	South		NB03FSFS357	01/20/16	N
White Perch-Fillet-with skin							
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPC-COMP09	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPC-COMP10	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPC-COMP11	04/26/16	N

TABLE 3-6
FISH AND CRAB TISSUE SAMPLES INCLUDED IN COPC SELECTION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Matrix	Tissue Type Code	Tissue Type Name	General Location	Specific Location	Sample Code	Date Sampled	Sample Type
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPC-COMP07	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPC-COMP08	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPC-COMP12	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	Central		NB03FWPDUP-15	04/27/16	FD
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPDUP-13	04/26/16	FD
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPN-COMP08	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPN-COMP10	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPN-COMP11	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPN-COMP12	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPDUP-14	04/27/16	FD
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPN-COMP07	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	North		NB03FWPN-COMP09	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPS-COMP10	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPS-COMP12	04/26/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPS-COMP07	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPS-COMP08	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPS-COMP09	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPS-COMP11	04/27/16	N
Fish	FWP	White Perch-Fillet-with skin	South		NB03FWPDUP-16	04/27/16	FD

Notes
COPC - Chemical of Potential Concern
CRB-HEP - Crab Hepatopancreas
CRB-MUS - Crab Muscle
FAE - Fish American Eel
FBF - Fish Blue Fish
FD - Field Duplicate.
FSB - Fish Striped Base
FSF - Fish Summer Flounder
FWP - Fish White Perch
N - Normal Sample.

TABLE 3-7
CO-ELUTING PCB CONGENERS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Co-Eluting PCB Congener Scheme 1	Co-Eluting PCB Congener Scheme 2
Sediment: Crab and Clam Sampling Program (2014) SQT & Porewater Sampling Program (2015)	Sediment: No sediment data reported using this scheme
Surface Water: No surface water data reported using this scheme	Surface Water: Chemical Water Column Monitoring Low Flow Surveys 1, 2, 3, 4 & 5, and High Flow Surveys 1 & 2 (August 2011 - June 2013)
Tissue: Crab and Clam Sampling Program (2014) Fish Sampling Program (2014, 2015, 2016)	Tissue: No tissue data reported using this scheme
PCB-12/13	PCB-12/13
PCB-18/30	PCB-18/30
PCB-20/28	PCB-20/28
PCB-21/33	PCB-21/33
PCB-26/29	PCB-26/29
PCB-40/71	
	PCB-40/41/71
	PCB-43/73
PCB-44/47/65	PCB-44/47/65
	PCB-45/51
PCB-49/69	PCB-49/69
PCB-50/53	PCB-50/53
PCB-59/62/75	PCB-59/62/75
PCB-61/70/74/76	PCB-61/70/74/76
	PCB-83/99
PCB-85/116/117	PCB-85/116/117
PCB-86/87/97/109/119/125	PCB-86/87/97/109/119/125
	PCB-88/91
PCB-90/101/113	PCB-90/101/113
PCB-93/100	PCB-93/100
PCB-98/102	PCB-98/102
PCB-108/124	PCB-108/124
PCB-110/115	PCB-110/115
PCB-128/166	PCB-128/166
PCB-129/138/163	
	PCB-129/138/160/163
	PCB-134/143
PCB-135/151	PCB-135/151
PCB-139/140	PCB-139/140
PCB-147/149	PCB-147/149
PCB-153/168	PCB-153/168
PCB-156/157	PCB-156/157
PCB-171/173	PCB-171/173
PCB-180/193	PCB-180/193
PCB-183/185	PCB-183/185
PCB-197/200	
PCB-198/199	PCB-198/199

TABLE 3-8
RAGS PART D TABLE 2.1: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – ACCESSIBLE SURFACE SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Sediment																	
	Dioxin-like Compounds																
	1746-01-6	2,3,7,8-TCDD	1.76E-06	J	2.71E-04	--	mg/kg	129	100	4.92E-08 - 5.57E-07	2.71E-04	--	4.80E-06	ca	Carc	Y	Known human carcinogen
	40321-76-4	1,2,3,7,8-PeCDD	2.22E-07	J	1.38E-05	--	mg/kg	129	100	6.01E-08 - 5.51E-07	1.38E-05	--	4.80E-06	ca	Carc	Y	Known human carcinogen
	39227-28-6	1,2,3,4,7,8-HxCDD	2.98E-07	J	1.24E-05	--	mg/kg	129	100	4.25E-08 - 3.72E-07	1.24E-05	--	4.80E-05	ca	Carc	Y	Known human carcinogen
	57653-85-7	1,2,3,6,7,8-HxCDD	1.15E-06	J	4.98E-05	--	mg/kg	129	100	4.32E-08 - 4.35E-07	4.98E-05	--	4.80E-05	ca	Carc	Y	Known human carcinogen
	19408-74-3	1,2,3,7,8,9-HxCDD	6.85E-07	J	2.74E-05	--	mg/kg	129	100	4.41E-08 - 3.78E-07	2.74E-05	--	4.80E-05	ca	Carc	Y	Known human carcinogen
	35822-46-9	1,2,3,4,6,7,8-HpCDD	2.00E-05	J	1.17E-03	J	mg/kg	129	100	5.59E-08 - 3.42E-07	1.17E-03	J	4.80E-04	ca	Carc	Y	Known human carcinogen
	3268-87-9	OCDD	2.12E-04	J	1.17E-02	J	mg/kg	129	100	4.81E-08 - 2.67E-07	1.17E-02	J	1.60E-02	ca	Carc	Y	Known human carcinogen
	51207-31-9	2,3,7,8-TCDF	9.16E-07	J	5.03E-05	J	mg/kg	129	100	7.76E-08 - 8.08E-07	5.03E-05	J	4.80E-05	ca	Carc	Y	Known human carcinogen
	57117-41-6	1,2,3,7,8-PeCDF	4.81E-07	J	3.65E-05	J	mg/kg	129	100	2.83E-08 - 3.83E-07	3.65E-05	J	1.60E-04	ca	Carc	Y	Known human carcinogen
	57117-31-4	2,3,4,7,8-PeCDF	7.90E-07	J	4.90E-05	J	mg/kg	129	100	2.67E-08 - 5.85E-07	4.90E-05	J	1.60E-05	ca	Carc	Y	Known human carcinogen
	70648-26-9	1,2,3,4,7,8-HxCDF	1.84E-06	J	4.33E-04	J	mg/kg	140	100	4.03E-08 - 3.14E-07	4.33E-04	J	4.80E-05	ca	Carc	Y	Known human carcinogen
	57117-44-9	1,2,3,6,7,8-HxCDF	8.30E-07	J	9.52E-05	J	mg/kg	140	100	4.03E-08 - 6.79E-07	9.52E-05	J	4.80E-05	ca	Carc	Y	Known human carcinogen
	72918-21-9	1,2,3,7,8,9-HxCDF	4.38E-08	U	4.86E-06	J	mg/kg	161	54	4.06E-08 - 1.09E-06	4.86E-06	J	4.80E-05	ca	Carc	Y	Known human carcinogen
	60851-34-5	2,3,4,6,7,8-HxCDF	7.83E-07	J	3.83E-05	J	mg/kg	129	100	3.87E-08 - 9.31E-07	3.83E-05	J	4.80E-05	ca	Carc	Y	Known human carcinogen
	67562-39-4	1,2,3,4,6,7,8-HpCDF	1.03E-05	J	1.88E-03	J	mg/kg	140	100	3.22E-08 - 2.48E-07	1.88E-03	J	4.80E-04	ca	Carc	Y	Known human carcinogen
	55673-89-7	1,2,3,4,7,8,9-HpCDF	6.18E-07	J	3.71E-05	J	mg/kg	140	100	4.28E-08 - 3.06E-07	3.71E-05	J	4.80E-04	ca	Carc	Y	Known human carcinogen
	39001-02-0	OCDF	1.64E-05	J	2.66E-03	J	mg/kg	140	100	4.83E-08 - 2.69E-07	2.66E-03	J	1.60E-02	ca	Carc	Y	Known human carcinogen
	--	KM TEQ DF	3.56E-06	J	3.53E-04	--	mg/kg	129	100	-- - --	3.53E-04	--	4.80E-06	ca	Carc	Y	Known human carcinogen
	32598-13-3	PCB-77	1.14E-04	J	4.34E-02	J	mg/kg	135	100	8.31E-05 - 2.52E-04	4.34E-02	J	3.80E-02	ca	Carc	Y	Known human carcinogen
	70362-50-4	PCB-81	3.61E-05	J	1.54E-03	--	mg/kg	135	32	8.31E-05 - 2.52E-04	1.54E-03	--	1.20E-02	ca	Carc	Y	Known human carcinogen
	32598-14-4	PCB-105	1.44E-04	U	6.77E-02	J	mg/kg	135	98	8.31E-05 - 2.52E-04	6.77E-02	J	1.20E-01	ca	Carc	Y	Known human carcinogen
	74472-37-0	PCB-114	3.67E-05	J	3.38E-03	--	mg/kg	135	83	8.31E-05 - 2.52E-04	3.38E-03	--	1.20E-01	ca	Carc	Y	Known human carcinogen
	31508-00-6	PCB-118	6.67E-04	--	1.28E-01	J	mg/kg	135	100	1.66E-04 - 5.04E-04	1.28E-01	J	1.20E-01	ca	Carc	Y	Known human carcinogen
	65510-44-3	PCB-123	3.69E-05	J	4.75E-03	--	mg/kg	135	85	8.31E-05 - 2.52E-04	4.75E-03	--	1.20E-01	ca	Carc	Y	Known human carcinogen
	57465-28-8	PCB-126	4.46E-05	J	1.10E-03	--	mg/kg	135	32	8.31E-05 - 2.52E-04	1.10E-03	--	3.60E-05	ca	Carc	Y	Known human carcinogen
	--	PCB-156/157	7.99E-05	J	1.25E-02	--	mg/kg	129	100	1.66E-04 - 5.04E-04	1.25E-02	--	1.20E-01	ca	Carc	Y	Known human carcinogen
	52663-72-6	PCB-167	5.60E-05	J	4.16E-03	--	mg/kg	129	95	8.31E-05 - 2.52E-04	4.16E-03	--	1.20E-01	ca	Carc	Y	Known human carcinogen
	32774-16-6	PCB-169	8.31E-05	U	2.52E-04	U	mg/kg	177	0	8.31E-05 - 2.52E-04	2.52E-04	U	1.20E-04	ca	Carc	Y	Known human carcinogen
	39635-31-9	PCB-189	3.36E-05	J	8.11E-04	--	mg/kg	129	73	8.31E-05 - 2.52E-04	8.11E-04	--	1.30E-01	ca	Carc	Y	Known human carcinogen
	--	KM TEQ PCB	4.71E-06	J	1.22E-04	--	mg/kg	135	100	-- - --	1.22E-04	--	4.80E-06	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																
	--	Total Non-DL PCBs	3.78E-02	J	3.74E+00	J	mg/kg	135	100	-- - --	3.74E+00	J	2.30E-01	ca	--	Y	Max > screening val
	PAHs																
	90-12-0	1-Methylnaphthalene	7.70E-03	J	3.40E-01	J	mg/kg	129	85	3.50E-02 - 6.60E-01	3.40E-01	J	1.80E+01	ca	--	N	Max ≤ screening val
	91-57-6	2-Methylnaphthalene	1.30E-02	J	3.30E-01	J	mg/kg	129	85	3.50E-02 - 6.60E-01	3.30E-01	J	2.40E+01	nc	--	N	Max ≤ screening val
	83-32-9	Acenaphthene	6.30E-03	J	9.60E-01	--	mg/kg	129	66	3.50E-02 - 6.60E-01	9.60E-01	--	3.60E+02	nc	--	N	Max ≤ screening val
	208-96-8	Acenaphthylene	1.10E-02	J	6.90E-01	--	mg/kg	176	95	3.50E-02 - 6.60E-01	6.90E-01	--	3.60E+02	nc	--	N	Max ≤ screening val
	120-12-7	Anthracene	1.40E-02	J	3.60E+00	--	mg/kg	134	100	3.50E-02 - 6.60E-01	3.60E+00	--	1.80E+03	nc	--	N	Max ≤ screening val
	56-55-3	Benz(a)anthracene	4.50E-02	J	7.70E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	7.70E+00	--	1.10E+00	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	50-32-8	Benzo(a)pyrene	6.50E-02	--	6.60E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	6.60E+00	--	1.10E-01	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	205-99-2	Benzo(b)fluoranthene	7.70E-02	--	6.40E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	6.40E+00	--	1.10E+00	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	192-97-2	Benzo(e)pyrene	7.40E-02	--	4.20E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	4.20E+00	--	1.80E+02	nc	--	N	Max ≤ screening val
	191-24-2	Benzo(g,h,i)perylene	3.90E-02	J	3.90E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	3.90E+00	--	1.80E+02	nc	--	N	Max ≤ screening val
	207-08-9	Benzo(k)fluoranthene	6.90E-02	--	5.40E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	5.40E+00	--	1.10E+01	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	--	C1-Chrysenes	6.50E-02	J	7.20E+00	J	mg/kg	176	100	3.50E-02 - 6.60E-01	7.20E+00	J	1.10E+02	ca	--	N	Max ≤ screening val
	--	C1-Fluoranthenes/Pyrenes	5.00E-02	J	8.80E+00	J	mg/kg	176	100	3.50E-02 - 6.60E-01	8.80E+00	J	1.80E+02	nc	--	N	Max ≤ screening val
	--	C1-Fluorenes	3.50E-02	U	6.60E-01	U	mg/kg	129	17	3.50E-02 - 6.60E-01	6.60E-01	U	2.40E+02	nc	--	N	Max ≤ screening val
	--	C1-Naphthalenes	3.50E-02	U	6.60E-01	U	mg/kg	129	17	3.50E-02 - 6.60E-01	6.60E-01	U	2.40E+01	nc	--	N	Max ≤ screening val
	--	C1-Phenanthrenes/Anthracenes	3.50E-02	U	4.20E+00	J	mg/kg	129	85	3.50E-02 - 6.60E-01	4.20E+00	J	1.80E+03	nc	--	N	Max ≤ screening val
	--	C2-Chrysenes	4.10E-02	U	4.10E+00	J	mg/kg	176	90	3.50E-02 - 6.60E-01	4.10E+00	J	1.10E+02	ca	--	N	Max ≤ screening val
	--	C2-Fluoranthenes/Pyrenes	4.90E-02	J	5.60E+00	J	mg/kg	176	100	3.50E-02 - 6.60E-01	5.60E+00	J	1.80E+02	nc	--	N	Max ≤ screening val
	--	C2-Fluorenes	3.50E-02	U	1.50E+00	J	mg/kg	176	49	3.50E-02 - 6.60E-01	1.50E+00	J	2.40E+02	nc	--	N	Max ≤ screening val
	--	C2-Naphthalenes	3.50E-02	U	1.30E+00	J	mg/kg	129	85	3.50E-02 - 6.60E-01	1.30E+00	J	2.40E+01	nc	--	N	Max ≤ screening val

TABLE 3-8
RAGS PART D TABLE 2.1: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – ACCESSIBLE SURFACE SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Sediment																	
	--	C2-Phenanthrenes/Anthracenes	4.10E-02	J	7.00E+00	J	mg/kg	176	93	3.50E-02 - 6.60E-01	7.00E+00	J	1.80E+03	nc	--	N	Max ≤ screening val
	--	C3-Chrysenes	4.10E-02	U, J	2.20E+00	J	mg/kg	176	90	3.50E-02 - 6.60E-01	2.20E+00	J	1.10E+02	ca	--	N	Max ≤ screening val
	--	C3-Fluoranthenes/Pyrenes	4.00E-02	U	3.70E+00	J	mg/kg	176	88	3.50E-02 - 6.60E-01	3.70E+00	J	1.80E+02	nc	--	N	Max ≤ screening val
	--	C3-Fluorenes	3.50E-02	U	2.60E+00	J	mg/kg	176	63	3.50E-02 - 6.60E-01	2.60E+00	J	2.40E+02	nc	--	N	Max ≤ screening val
	--	C3-Naphthalenes	4.10E-02	U	3.50E+00	J	mg/kg	176	95	3.50E-02 - 6.60E-01	3.50E+00	J	2.40E+01	nc	--	N	Max ≤ screening val
	--	C3-Phenanthrenes/Anthracenes	3.50E-02	U	7.10E+00	J	mg/kg	176	83	3.50E-02 - 6.60E-01	7.10E+00	J	1.80E+03	nc	--	N	Max ≤ screening val
	--	C4-Chrysenes	3.50E-02	U	7.20E-01	J	mg/kg	173	63	3.50E-02 - 6.60E-01	7.20E-01	J	1.10E+02	ca	--	N	Max ≤ screening val
	--	C4-Naphthalenes	3.50E-02	U	6.50E+00	J	mg/kg	176	80	3.50E-02 - 6.60E-01	6.50E+00	J	2.40E+01	nc	--	N	Max ≤ screening val
	--	C4-Phenanthrenes/Anthracenes	3.50E-02	U	4.60E+00	J	mg/kg	176	80	3.50E-02 - 6.60E-01	4.60E+00	J	1.80E+03	nc	--	N	Max ≤ screening val
	218-01-9	Chrysene	6.70E-02	--	6.90E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	6.90E+00	--	1.10E+02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	53-70-3	Dibenz(a,h)anthracene	1.60E-02	J	1.40E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	1.40E+00	--	1.10E-01	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	206-44-0	Fluoranthene	8.00E-02	--	1.40E+01	--	mg/kg	129	100	3.50E-02 - 6.60E-01	1.40E+01	--	2.40E+02	nc	--	N	Max ≤ screening val
	86-73-7	Fluorene	1.60E-02	J	1.10E+00	--	mg/kg	129	66	3.50E-02 - 6.60E-01	1.10E+00	--	2.40E+02	nc	--	N	Max ≤ screening val
	193-39-5	Indeno(1,2,3-c,d)-pyrene	3.60E-02	J	3.90E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	3.90E+00	--	1.10E+00	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	91-20-3	Naphthalene	1.30E-02	J	5.40E-01	J	mg/kg	129	85	3.50E-02 - 6.60E-01	5.40E-01	J	3.80E+00	ca	--	N	Max ≤ screening val
	198-55-0	Perylene	2.00E-02	J	1.70E+00	--	mg/kg	129	100	3.50E-02 - 6.60E-01	1.70E+00	--	1.80E+02	nc	--	N	Max ≤ screening val
	85-01-8	Phenanthrene	2.60E-02	J	1.10E+01	--	mg/kg	129	100	3.50E-02 - 6.60E-01	1.10E+01	--	1.80E+03	nc	--	N	Max ≤ screening val
	129-00-0	Pyrene	1.10E-01	--	1.40E+01	--	mg/kg	129	100	3.50E-02 - 6.60E-01	1.40E+01	--	1.80E+02	nc	--	N	Max ≤ screening val
	Pesticides & Organics																
	95-50-1	1,2-Dichlorobenzene	1.00E-03	U	4.00E-03	U	mg/kg	161, 174, 177	0	1.00E-03 - 4.00E-03	4.00E-03	U	1.80E+02	nc	--	N	Not detected, max DL ≤ screening val
	122-66-7	1,2-Diphenylhydrazine	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	6.80E-01	ca	--	N	Not detected, max DL ≤ screening val
	120-82-1	1,2,4-Trichlorobenzene	1.00E-03	U	4.00E-03	U	mg/kg	161, 174, 177	0	1.00E-03 - 4.00E-03	4.00E-03	U	5.80E+00	nc	--	N	Not detected, max DL ≤ screening val
	95-94-3	1,2,4,5-Tetrachlorobenzene	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	2.30E+00	nc	--	N	Not detected, max DL ≤ screening val
	541-73-1	1,3-Dichlorobenzene	1.00E-03	U	4.00E-03	U	mg/kg	161, 174, 177	0	1.00E-03 - 4.00E-03	4.00E-03	U	1.80E+02	nc	--	N	Not detected, max DL ≤ screening val
	106-46-7	1,4-Dichlorobenzene	1.00E-03	U	4.00E-03	U	mg/kg	161, 174, 177	0	1.00E-03 - 4.00E-03	4.00E-03	U	2.60E+00	ca	--	N	Not detected, max DL ≤ screening val
	91-58-7	2-Chloronaphthalene	9.00E-03	U	1.70E-02	U	mg/kg	166, 177	0	9.00E-03 - 1.70E-02	1.70E-02	U	4.80E+02	nc	--	N	Not detected, max DL ≤ screening val
	95-57-8	2-Chlorophenol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	3.90E+01	nc	--	N	Not detected, max DL ≤ screening val
	88-74-4	2-Nitroaniline	2.10E-02	U	4.30E-02	U	mg/kg	177	3	2.10E-02 - 4.30E-02	4.30E-02	U	6.30E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	88-75-5	2-Nitrophenol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	1.90E+03	nc	--	N	Not detected, max DL ≤ screening val
	58-90-2	2,3,4,6-Tetrachlorophenol	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	1.90E+02	nc	--	N	Not detected, max DL ≤ screening val
	94-75-7	2,4-D	1.50E-02	U	4.70E-01	U	mg/kg	129	5	1.50E-02 - 4.70E-01	4.70E-01	U	7.00E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	94-82-6	2,4-DB	7.60E-03	U	2.40E-01	U	mg/kg	129	5	7.60E-03 - 2.40E-01	2.40E-01	U	1.90E+02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	120-83-2	2,4-Dichlorophenol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	1.90E+01	nc	--	N	Not detected, max DL ≤ screening val
	105-67-9	2,4-Dimethylphenol	2.10E-02	U	1.30E-01	--	mg/kg	178	6	2.10E-02 - 4.30E-02	1.30E-01	--	1.30E+02	nc	--	N	Max ≤ screening val
	51-28-5	2,4-Dinitrophenol	3.70E-01	U	7.80E-01	U	mg/kg	177	0	3.70E-01 - 7.80E-01	7.80E-01	U	1.30E+01	nc	--	N	Not detected, max DL ≤ screening val
	121-14-2	2,4-Dinitrotoluene	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	1.70E+00	ca	--	N	Not detected, max DL ≤ screening val
	93-76-5	2,4,5-T	1.00E-03	U	3.20E-02	U	mg/kg	129	17	1.00E-03 - 3.20E-02	3.20E-02	U	6.30E+01	nc	--	N	Max ≤ screening val
	93-72-1	2,4,5-TP (Silvex)	9.20E-04	U	2.90E-02	U	mg/kg	129	2	9.20E-04 - 2.90E-02	2.90E-02	U	5.10E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	95-95-4	2,4,5-Trichlorophenol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	6.30E+02	nc	--	N	Not detected, max DL ≤ screening val
	88-06-2	2,4,6-Trichlorophenol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	6.30E+00	nc	--	N	Not detected, max DL ≤ screening val
	53-19-0	2,4'-DDD	2.43E-04	--	8.87E-02	J	mg/kg	122B	100	5.01E-06 - 3.86E-04	8.87E-02	J	1.90E-01	nc	--	N	Max ≤ screening val
	3424-82-6	2,4'-DDE	3.07E-04	--	1.11E-01	J	mg/kg	173	100	5.04E-06 - 7.71E-04	1.11E-01	J	2.00E+00	ca	--	N	Max ≤ screening val
	789-02-6	2,4'-DDT	6.10E-06	U	2.17E-02	--	mg/kg	129	73	6.10E-06 - 8.18E-05	2.17E-02	--	1.90E+00	ca	--	N	Max ≤ screening val
	606-20-2	2,6-Dinitrotoluene	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	3.60E-01	ca	--	N	Not detected, max DL ≤ screening val
	638-36-8	2,6,10,14-Tetramethylhexadecane	1.36E-02	U	6.77E-01	J	mg/kg	127B	32	1.36E-02 - 3.14E-01	6.77E-01	J	2.30E+04	nc	--	N	Max ≤ screening val
	1921-70-6	2,6,10,14-Tetramethylpentadecane	2.10E-02	U	1.18E+00	--	mg/kg	127B	15	2.10E-02 - 4.85E-01	1.18E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	99-09-2	3-Nitroaniline	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	6.30E+01	nc	--	N	Not detected, max DL ≤ screening val
	91-94-1	3,3'-Dichlorobenzidine	1.20E-01	U	2.60E-01	U	mg/kg	177	0	1.20E-01 - 2.60E-01	2.60E-01	U	1.20E+00	ca	--	N	Not detected, max DL ≤ screening val
	101-55-3	4-Bromophenyl phenyl ether	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	59-50-7	4-Chloro-3-methylphenol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	6.30E+02	nc	--	N	Not detected, max DL ≤ screening val
	106-47-8	4-Chloroaniline	2.10E-02	U	8.90E-02	--	mg/kg	129	3	2.10E-02 - 8.70E-02	8.90E-02	--	2.70E+00	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	7005-72-3	4-Chlorophenyl phenyl ether	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	106-44-5	4-Methylphenol	2.10E-02	U	2.70E-01	--	mg/kg	133	68	2.10E-02 - 4.30E-02	2.70E-01	--	6.30E+02	nc	--	N	Max ≤ screening val
	100-01-6	4-Nitroaniline	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	2.50E+01	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-8
RAGS PART D TABLE 2.1: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – ACCESSIBLE SURFACE SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Sediment																	
	100-02-7	4-Nitrophenol	2.10E-01	U	4.30E-01	U	mg/kg	177	0	2.10E-01 - 4.30E-01	4.30E-01	U	1.90E+03	nc	--	N	Not detected, max DL ≤ screening val
	72-54-8	4,4'-DDD	8.63E-04	J	1.76E-01	J	mg/kg	134	100	5.17E-06 - 7.71E-04	1.76E-01	J	1.90E-01	nc	--	N	Max ≤ screening val
	72-55-9	4,4'-DDE	1.05E-03	J	2.41E-01	J	mg/kg	173	100	8.07E-06 - 7.71E-04	2.41E-01	J	2.00E+00	ca	--	N	Max ≤ screening val
	50-29-3	4,4'-DDT	3.00E-05	U	6.38E-02	J	mg/kg	134	98	9.18E-06 - 7.71E-04	6.38E-02	J	1.90E+00	ca	--	N	Max ≤ screening val
	534-52-1	4,6-Dinitro-2-methylphenol	2.10E-01	U	4.30E-01	U	mg/kg	177	0	2.10E-01 - 4.30E-01	4.30E-01	U	5.10E-01	nc	--	N	Not detected, max DL ≤ screening val
	98-86-2	Acetophenone	2.10E-02	U	4.70E-01	--	mg/kg	130	41	2.10E-02 - 4.60E-02	4.70E-01	--	7.80E+02	nc	--	N	Max ≤ screening val
	309-00-2	Aldrin	5.37E-06	U	8.38E-04	J	mg/kg	127B	3	5.37E-06 - 7.71E-04	8.38E-04	J	3.90E-02	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	319-84-6	alpha-BHC	7.68E-06	U	5.96E-04	--	mg/kg	129	85	7.68E-06 - 4.09E-05	5.96E-04	--	8.60E-02	ca	--	N	Max ≤ screening val
	1912-24-9	Atrazine	4.10E-02	U	8.70E-02	U	mg/kg	177	0	4.10E-02 - 8.70E-02	8.70E-02	U	2.40E+00	ca	--	N	Not detected, max DL ≤ screening val
	100-52-7	Benzaldehyde	8.20E-02	U	2.10E-01	J	mg/kg	130	6	8.20E-02 - 1.70E-01	2.10E-01	J	1.70E+02	ca	--	N	Max ≤ screening val
	92-87-5	Benzidine	8.60E-01	U	1.80E+00	U	mg/kg	166, 177	0	8.60E-01 - 1.80E+00	1.80E+00	U	5.30E-04	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	65-85-0	Benzoic Acid	2.10E-01	U	7.20E-01	J	mg/kg	134	8	2.10E-01 - 4.30E-01	7.20E-01	J	2.50E+04	nc	--	N	Max ≤ screening val
	319-85-7	beta-BHC	6.63E-06	J	7.07E-04	J	mg/kg	129	59	1.26E-05 - 4.09E-05	7.07E-04	J	3.00E-01	ca	--	N	Max ≤ screening val
	92-52-4	Biphenyl	2.10E-02	U	1.60E-01	--	mg/kg	134	28	2.10E-02 - 4.30E-02	1.60E-01	--	4.70E+00	nc	--	N	Max ≤ screening val
	108-60-1	Bis(2-chloro-1-methylethyl) ether	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	3.10E+02	nc	--	N	Not detected, max DL ≤ screening val
	111-91-1	Bis(2-chloroethoxy)methane	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	1.90E+01	nc	--	N	Not detected, max DL ≤ screening val
	111-44-4	Bis(2-chloroethyl)ether	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	2.30E-01	ca	--	N	Not detected, max DL ≤ screening val
	117-81-7	Bis(2-ethylhexyl)phthalate	9.00E-02	U	3.80E+01	J	mg/kg	172	90	8.20E-02 - 1.40E+00	3.80E+01	J	3.90E+01	ca	--	N	Max ≤ screening val
	85-68-7	Butyl benzyl phthalate	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	3	8.20E-02 - 1.70E-01	1.70E-01	U	2.90E+02	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	105-60-2	Caprolactam	4.10E-02	U	8.70E-02	U	mg/kg	177	0	4.10E-02 - 8.70E-02	8.70E-02	U	3.10E+03	nc	--	N	Not detected, max DL ≤ screening val
	86-74-8	Carbazole	2.10E-02	U	4.60E+00	--	mg/kg	134	49	2.10E-02 - 4.30E-02	4.60E+00	--	2.40E+02	nc	--	N	Max ≤ screening val
	5103-71-9	Chlordane, alpha (cis)	9.59E-06	U	9.29E-03	--	mg/kg	129	98	9.59E-06 - 4.09E-05	9.29E-03	--	1.70E+00	ca	--	N	Max ≤ screening val
	5103-74-2	Chlordane, gamma (trans)	1.14E-05	U	1.27E-02	J	mg/kg	129	98	1.14E-05 - 3.86E-04	1.27E-02	J	1.70E+00	ca	--	N	Max ≤ screening val
	319-86-8	Delta-BHC	7.34E-06	U	4.11E-05	--	mg/kg	132A	7	7.34E-06 - 4.09E-05	4.11E-05	--	8.60E-02	ca	--	N	Max ≤ screening val
	84-74-2	Di-n-butyl phthalate	8.20E-02	U	1.70E-01	J, U	mg/kg	149, 166, 177	3	8.20E-02 - 1.70E-01	1.70E-01	J, U	6.30E+02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	117-84-0	Di-n-octyl phthalate	8.20E-02	U	2.50E-01	J	mg/kg	160	3	8.20E-02 - 1.70E-01	2.50E-01	J	6.30E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	132-64-9	Dibenzofuran	2.10E-02	U	9.70E-01	--	mg/kg	134	51	2.10E-02 - 4.30E-02	9.70E-01	--	7.30E+00	nc	--	N	Max ≤ screening val
	1002-53-5	Dibutyltin	1.60E-03	U	1.50E-02	J	mg/kg	176	27	1.60E-03 - 3.60E-03	1.50E-02	J	1.90E+00	nc	--	N	Max ≤ screening val
	60-57-1	Dieldrin	8.62E-06	U	2.09E-02	J	mg/kg	129	93	8.62E-06 - 3.86E-04	2.09E-02	J	3.40E-02	ca	--	N	Max ≤ screening val
	84-66-2	Diethyl phthalate	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	5.10E+03	nc	--	N	Not detected, max DL ≤ screening val
	131-11-3	Dimethyl phthalate	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	5.10E+03	nc	--	N	Not detected, max DL ≤ screening val
	544-85-4	Dotriacontane	1.60E-02	U	1.37E+00	--	mg/kg	135	76	1.60E-02 - 3.71E-01	1.37E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	959-98-8	Endosulfan I	2.05E-05	U	4.09E-04	U	mg/kg	131A	5	2.05E-05 - 4.09E-04	4.09E-04	U	4.70E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	33213-65-9	Endosulfan II	4.26E-05	U	4.09E-04	U	mg/kg	131A	5	4.26E-05 - 4.09E-04	4.09E-04	U	4.70E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	1031-07-8	Endosulfan sulfate	4.47E-05	U	4.09E-04	U	mg/kg	131A	0	4.47E-05 - 4.09E-04	4.09E-04	U	4.70E+01	nc	--	N	Not detected, max DL ≤ screening val
	72-20-8	Endrin	1.04E-05	U	8.18E-05	U	mg/kg	131A	0	1.04E-05 - 8.18E-05	8.18E-05	U	1.90E+00	nc	--	N	Not detected, max DL ≤ screening val
	7421-93-4	Endrin aldehyde	4.06E-05	U	4.09E-04	U	mg/kg	131A	0	4.06E-05 - 4.09E-04	4.09E-04	U	1.90E+00	nc	--	N	Not detected, max DL ≤ screening val
	53494-70-5	Endrin ketone	2.58E-05	U	4.09E-04	U	mg/kg	131A	0	2.58E-05 - 4.09E-04	4.09E-04	U	1.90E+00	nc	--	N	Not detected, max DL ≤ screening val
	58-89-9	Gamma-BHC (Lindane)	6.29E-06	J	2.17E-04	--	mg/kg	129	22	7.30E-06 - 4.09E-05	2.17E-04	--	5.70E-01	ca	--	N	Max ≤ screening val
	629-94-7	Heneicosane	1.49E-02	U	3.78E-01	J	mg/kg	135	54	1.36E-02 - 3.14E-01	3.78E-01	J	2.30E+04	nc	--	N	Max ≤ screening val
	630-04-6	Hentriacontane	2.37E-02	U	2.74E+00	--	mg/kg	135	73	2.00E-02 - 4.62E-01	2.74E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	76-44-8	Heptachlor	1.04E-05	U	3.86E-03	U	mg/kg	129	15	1.04E-05 - 3.86E-03	3.86E-03	U	1.30E-01	ca	--	N	Max ≤ screening val
	1024-57-3	Heptachlor epoxide, cis-	9.35E-06	U	1.17E-03	--	mg/kg	129	63	9.35E-06 - 4.09E-05	1.17E-03	--	7.00E-02	ca	--	N	Max ≤ screening val
	28044-83-9	Heptachlor epoxide, trans-	1.29E-05	U	1.08E-03	--	mg/kg	129	49	1.29E-05 - 8.18E-05	1.08E-03	--	7.00E-02	ca	--	N	Max ≤ screening val
	593-49-7	Heptacosane	3.95E-02	U	9.13E-01	U	mg/kg	127B	20	3.95E-02 - 9.13E-01	9.13E-01	U	2.30E+04	nc	--	N	Max ≤ screening val
	629-78-7	Heptadecane	2.32E-02	U	6.88E-01	J	mg/kg	178	68	2.22E-02 - 5.14E-01	6.88E-01	J	9.60E+00	nc	--	N	Max ≤ screening val
	7194-84-5	Heptatriacontane, -n	1.40E-02	U	3.14E-01	U	mg/kg	127B	54	1.36E-02 - 3.14E-01	3.14E-01	U	2.30E+04	nc	--	N	Max ≤ screening val
	118-74-1	Hexachlorobenzene	1.67E-04	J	2.48E-02	J	mg/kg	129	100	5.26E-06 - 3.86E-04	2.48E-02	J	2.10E-01	ca	--	N	Max ≤ screening val
	87-68-3	Hexachlorobutadiene	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	1.20E+00	ca	--	N	Not detected, max DL ≤ screening val
	77-47-4	Hexachlorocyclopentadiene	2.10E-01	U	4.30E-01	U	mg/kg	177	0	2.10E-01 - 4.30E-01	4.30E-01	U	1.80E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	67-72-1	Hexachloroethane	4.10E-02	U	8.70E-02	U	mg/kg	177	0	4.10E-02 - 8.70E-02	8.70E-02	U	1.80E+00	ca	--	N	Not detected, max DL ≤ screening val
	630-06-8	Hexatriacontane	1.36E-02	U	9.47E-01	J	mg/kg	123A	29	1.36E-02 - 3.14E-01	9.47E-01	J	2.30E+04	nc	--	N	Max ≤ screening val
	78-59-1	Isophorone	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	5.70E+02	ca	--	N	Not detected, max DL ≤ screening val
	72-43-5	Methoxychlor	1.18E-05	U	3.86E-03	U	mg/kg	129	3	1.18E-05 - 3.86E-03	3.86E-03	U	3.20E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val

TABLE 3-8
RAGS PART D TABLE 2.1: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – ACCESSIBLE SURFACE SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Sediment																	
	2385-85-5	Mirex	4.91E-06	U	2.44E-04	--	mg/kg	123A	10	4.91E-06 - 4.09E-05	2.44E-04	--	3.60E-02	ca	--	N	Max ≤ screening val
	2406-65-7	Monobutyltin hydride	2.50E-02	U	5.80E-02	U	mg/kg	164	0	2.50E-02 - 5.80E-02	5.80E-02	U	1.90E+00	nc	--	N	Not detected, max DL ≤ screening val
	124-18-5	n-Decane	1.83E-02	U	4.22E-01	U	mg/kg	127B	0	1.83E-02 - 4.22E-01	4.22E-01	U	9.60E+00	nc	--	N	Not detected, max DL ≤ screening val
	629-97-0	n-Docosane	1.36E-02	U	1.08E+00	--	mg/kg	134	61	0.00E+00 - 3.14E-01	1.08E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	112-40-3	n-Dodecane	1.36E-02	U	3.14E-01	U	mg/kg	127B	10	1.36E-02 - 3.14E-01	3.14E-01	U	9.60E+00	nc	--	N	Max ≤ screening val
	112-95-8	n-Eicosane	1.48E-02	U	3.42E-01	U	mg/kg	127B	27	1.48E-02 - 3.42E-01	3.42E-01	U	2.30E+04	nc	--	N	Max ≤ screening val
	630-01-3	n-Hexacosane	2.35E-02	U	1.12E+00	--	mg/kg	127B	27	2.35E-02 - 5.42E-01	1.12E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	544-76-3	n-Hexadecane	1.36E-02	U	6.97E-01	J	mg/kg	172	46	1.36E-02 - 3.14E-01	6.97E-01	J	9.60E+00	nc	--	N	Max ≤ screening val
	621-64-7	N-nitroso-di-n-propylamine	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	7.80E-02	ca	--	N	Not detected, max DL ≤ screening val
	86-30-6	N-Nitrosodiphenylamine	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	1.10E+02	ca	--	N	Not detected, max DL ≤ screening val
	111-84-2	n-Nonane	1.36E-02	U	3.14E-01	U	mg/kg	127B	2	1.36E-02 - 3.14E-01	3.14E-01	U	1.10E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	630-02-4	n-Octacosane	2.64E-02	J	4.25E+00	--	mg/kg	134	93	1.36E-02 - 3.14E-01	4.25E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	593-45-3	n-Octadecane	1.85E-02	U	4.28E-01	U	mg/kg	127B	37	1.85E-02 - 4.28E-01	4.28E-01	U	9.60E+00	nc	--	N	Max ≤ screening val
	646-31-1	n-Tetracosane	1.36E-02	U	4.80E+00	J	mg/kg	160	44	1.36E-02 - 3.14E-01	4.80E+00	J	2.30E+04	nc	--	N	Max ≤ screening val
	629-59-4	n-Tetradecane	1.73E-02	U	3.99E-01	U	mg/kg	127B	7	1.73E-02 - 3.99E-01	3.99E-01	U	9.60E+00	nc	--	N	Max ≤ screening val
	638-68-6	n-Triacontane	2.52E-02	U	2.44E+00	--	mg/kg	134	61	2.49E-02 - 5.76E-01	2.44E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	629-50-5	n-Tridecane	1.36E-02	U	3.14E-01	U	mg/kg	127B	7	1.36E-02 - 3.14E-01	3.14E-01	U	9.60E+00	nc	--	N	Max ≤ screening val
	1120-21-4	n-Undecane	2.49E-02	U	5.76E-01	U	mg/kg	127B	0	2.49E-02 - 5.76E-01	5.76E-01	U	9.60E+00	nc	--	N	Not detected, max DL ≤ screening val
	98-95-3	Nitrobenzene	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	5.10E+00	ca	--	N	Not detected, max DL ≤ screening val
	5103-73-1	Nonachlor, cis-	1.01E-05	U	2.54E-03	--	mg/kg	129	88	1.01E-05 - 4.09E-05	2.54E-03	--	1.70E+00	ca	--	N	Max ≤ screening val
	39765-80-5	Nonachlor, trans-	7.60E-06	U	4.55E-03	--	mg/kg	129	90	7.60E-06 - 4.09E-05	4.55E-03	--	1.70E+00	ca	--	N	Max ≤ screening val
	630-03-5	Nonacosane	2.76E-02	U	2.25E+00	--	mg/kg	134	95	1.36E-02 - 3.14E-01	2.25E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	629-92-5	Nonadecane	1.98E-02	U	7.23E-01	--	mg/kg	135	24	1.98E-02 - 4.56E-01	7.23E-01	--	2.30E+04	nc	--	N	Max ≤ screening val
	7194-86-7	Nonatriacontane	2.47E-02	U	5.71E-01	U	mg/kg	127B	29	2.47E-02 - 5.71E-01	5.71E-01	U	2.30E+04	nc	--	N	Max ≤ screening val
	95-48-7	o-Cresol	2.10E-02	U	4.30E-02	U	mg/kg	177	0	2.10E-02 - 4.30E-02	4.30E-02	U	3.20E+02	nc	--	N	Not detected, max DL ≤ screening val
	7194-85-6	Octatriacontane	1.85E-02	U	6.48E-01	J	mg/kg	171	22	1.85E-02 - 4.28E-01	6.48E-01	J	2.30E+04	nc	--	N	Max ≤ screening val
	27304-13-8	Oxychlordane	8.66E-06	U	7.66E-05	--	mg/kg	127A	15	8.66E-06 - 4.09E-05	7.66E-05	--	1.70E+00	ca	--	N	Max ≤ screening val
	87-86-5	Pentachlorophenol	4.10E-02	U	8.70E-02	U	mg/kg	177	0	4.10E-02 - 8.70E-02	8.70E-02	U	1.00E+00	ca	--	N	Not detected, max DL ≤ screening val
	629-99-2	Pentacosane	1.36E-02	U	1.03E+00	J	mg/kg	178	44	1.36E-02 - 3.14E-01	1.03E+00	J	2.30E+04	nc	--	N	Max ≤ screening val
	629-62-9	Pentadecane	1.36E-02	U	7.08E-01	--	mg/kg	134	32	1.36E-02 - 3.14E-01	7.08E-01	--	9.60E+00	nc	--	N	Max ≤ screening val
	630-07-9	Pentatriacontane	1.37E-02	U	3.60E-01	J	mg/kg	172	54	1.36E-02 - 3.14E-01	3.60E-01	J	2.30E+04	nc	--	N	Max ≤ screening val
	--	PHC as gasoline	3.00E-01	U	3.70E+01	--	mg/kg	134	17	3.00E-01 - 8.80E+00	3.70E+01	--	8.20E+00	nc	--	Y	Max > screening val
	108-95-2	Phenol	2.10E-02	U	1.50E-01	--	mg/kg	130	17	2.10E-02 - 4.30E-02	1.50E-01	--	1.90E+03	nc	--	N	Max ≤ screening val
	110-86-1	Pyridine	8.20E-02	U	1.70E-01	U	mg/kg	166, 177	0	8.20E-02 - 1.70E-01	1.70E-01	U	7.80E+00	nc	--	N	Not detected, max DL ≤ screening val
	1461-25-2	Tetrabutyltin	2.10E-03	U	4.80E-03	U	mg/kg	164	2	2.10E-03 - 4.80E-03	4.80E-03	U	1.90E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	4181-95-7	Tetracontane	1.49E-02	U	4.03E-01	J	mg/kg	129	61	1.36E-02 - 3.14E-01	4.03E-01	J	2.30E+04	nc	--	N	Max ≤ screening val
	14167-59-0	Tetratriacontane	1.60E-02	U	3.71E-01	U	mg/kg	127B	20	1.60E-02 - 3.71E-01	3.71E-01	U	2.30E+04	nc	--	N	Max ≤ screening val
	--	TPH (C9-C40)	1.04E+01	U	1.29E+03	J	mg/kg	178	98	4.94E+00 - 1.14E+02	1.29E+03	J	1.10E+01	nc	--	Y	Max > screening val
	688-73-3	Tri-n-butyltin hydride	1.80E-03	U	1.60E-02	J	mg/kg	164	24	1.80E-03 - 4.20E-03	1.60E-02	J	2.30E+00	nc	--	N	Max ≤ screening val
	638-67-5	Tricosane	1.78E-02	U	1.06E+00	--	mg/kg	134	73	1.73E-02 - 3.99E-01	1.06E+00	--	2.30E+04	nc	--	N	Max ≤ screening val
	630-05-7	Tritriacontane	2.72E-02	U	1.04E+00	J	mg/kg	134	17	2.72E-02 - 6.28E-01	1.04E+00	J	2.30E+04	nc	--	N	Max ≤ screening val
	Inorganics																
	7429-90-5	Aluminum	4.67E+03	--	2.33E+04	J	mg/kg	178	100	3.47E+00 - 1.48E+01	2.33E+04	J	7.70E+03	nc	--	Y	Max > screening val
	7440-36-0	Antimony	8.77E-02	U	7.79E+00	--	mg/kg	129	98	8.77E-02 - 1.75E-01	7.79E+00	--	3.10E+00	nc	--	Y	Max > screening val
	7440-38-2	Arsenic, inorganic	2.39E+00	--	1.15E+02	--	mg/kg	129	100	1.01E-01 - 3.97E-01	1.15E+02	--	6.80E-01	ca	Carc	Y	Known human carcinogen
	7440-39-3	Barium	3.21E+01	--	6.63E+02	--	mg/kg	129	100	7.77E-02 - 6.61E-01	6.63E+02	--	1.50E+03	nc	--	N	Max ≤ screening val
	7440-41-7	Beryllium	2.84E-01	--	3.12E+00	J	mg/kg	134	100	1.07E-02 - 3.76E-02	3.12E+00	J	1.60E+01	nc	--	N	Max ≤ screening val
	7440-43-9	Cadmium	1.37E-01	--	1.37E+01	--	mg/kg	129	100	2.40E-02 - 1.22E-01	1.37E+01	--	7.10E+00	nc	--	Y	Max > screening val
	7440-70-2	Calcium	1.02E+03	--	2.74E+04	--	mg/kg	175	100	1.88E+01 - 4.93E+01	2.74E+04	--	Essential nutrient	--	--	N	Essential nutrient
	18540-29-9	Chromium (VI)	6.20E-01	U	8.00E+00	--	mg/kg	125	12	6.20E-01 - 1.40E+00	8.00E+00	--	3.00E-01	ca	Carc	Y	Known human carcinogen
	7440-47-3	Chromium [as Cr(III)]	1.81E+01	--	2.80E+02	J	mg/kg	173	100	1.27E-01 - 2.65E-01	2.80E+02	J	3.00E-01	ca	Carc	Y	Known human carcinogen
	7440-48-4	Cobalt	3.41E+00	--	3.74E+01	J	mg/kg	134	100	2.37E-02 - 5.30E-02	3.74E+01	J	2.30E+00	nc	--	Y	Max > screening val
	7440-50-8	Copper	1.45E+01	--	4.43E+02	--	mg/kg	129	100	1.06E-01 - 1.56E+00	4.43E+02	--	3.10E+02	nc	--	Y	Max > screening val
	57-12-5	Cyanide	2.20E-01	U	7.20E-01	J	mg/kg	134	5	2.20E-01 - 5.00E-01	7.20E-01	J	2.30E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val

TABLE 3-8
RAGS PART D TABLE 2.1: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – ACCESSIBLE SURFACE SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Sediment																	
	7439-89-6	Iron	9.06E+03	--	1.48E+05	--	mg/kg	129	100	6.14E+00 - 2.34E+02	1.48E+05	--	5.50E+03	nc	--	Y	Max > screening val
	7439-92-1	Lead	2.61E+01	--	2.19E+03	--	mg/kg	129	100	1.52E-02 - 6.24E-01	2.19E+03	--	4.00E+02	nc	--	Y	Max > screening val
	7439-95-4	Magnesium	2.29E+03	--	1.40E+04	J	mg/kg	174	100	2.85E+00 - 8.95E+00	1.40E+04	J	Essential nutrient	--	--	N	Essential nutrient
	7439-96-5	Manganese	7.68E+01	--	5.89E+02	J	mg/kg	178	100	9.02E-02 - 7.76E-01	5.89E+02	J	1.80E+02	nc	--	Y	Max > screening val
	7439-97-6	Mercury	1.42E-01	--	7.39E+00	--	mg/kg	129	100	2.88E-03 - 2.49E-02	7.39E+00	--	1.10E+00	nc	--	Y	Max > screening val
	22967-92-6	Methyl Mercury	1.10E-04	--	1.19E-02	--	mg/kg	129	100	1.80E-05 - 4.19E-04	1.19E-02	--	7.80E-01	nc	--	N	Max ≤ screening val
	7440-02-0	Nickel	1.03E+01	--	1.82E+02	J	mg/kg	172	100	1.00E-01 - 4.98E-01	1.82E+02	J	1.50E+02	nc	--	Y	Max > screening val
	7723-14-0	Phosphorus	1.55E+02	--	1.59E+03	--	mg/kg	161	100	1.21E+01 - 2.68E+02	1.59E+03	--	Essential nutrient	--	--	N	Essential nutrient
	7440-09-7	Potassium	1.07E+03	--	6.17E+03	J	mg/kg	178	100	9.21E+00 - 3.24E+01	6.17E+03	J	Essential nutrient	--	--	N	Essential nutrient
	7782-49-2	Selenium	1.41E-01	J	3.74E+00	J	mg/kg	178	100	1.19E-01 - 2.65E-01	3.74E+00	J	3.90E+01	nc	--	N	Max ≤ screening val
	7440-22-4	Silver	1.17E-01	J	5.80E+00	--	mg/kg	129	100	2.37E-02 - 5.30E-02	5.80E+00	--	3.90E+01	nc	--	N	Max ≤ screening val
	7440-23-5	Sodium	2.56E+03	--	1.84E+04	J	mg/kg	177	100	1.19E+01 - 2.97E+01	1.84E+04	J	Essential nutrient	--	--	N	Essential nutrient
	18496-25-8	Sulfide	1.04E+01	--	1.67E+03	--	mg/kg	174	100	-- - --	1.67E+03	--	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	7440-28-0	Thallium	5.41E-02	J	7.17E-01	J	mg/kg	161	100	3.56E-02 - 1.46E-01	7.17E-01	J	7.80E-02	nc	--	Y	Max > screening val
	7440-32-6	Titanium	1.64E+02	--	6.75E+02	J	mg/kg	174	100	2.02E-01 - 4.50E-01	6.75E+02	J	1.40E+04	nc	--	N	Max ≤ screening val
	7440-62-2	Vanadium	1.20E+01	--	1.42E+02	--	mg/kg	129	100	3.56E-02 - 7.95E-02	1.42E+02	--	3.90E+01	nc	--	Y	Max > screening val
	7440-66-6	Zinc	7.03E+01	--	6.81E+03	J	mg/kg	134	100	5.44E-01 - 2.32E+01	6.81E+03	J	2.30E+03	nc	--	Y	Max > screening val

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements, ca - based on carcinogenic effects, Carc - known human carcinogen, chem - chemical, chems - chemicals, COPC - chemical of potential concern, cPAH - carcinogenic PAH, DF - dioxin/furan,
DL - detection limit, DLC - dioxin-like compound, eval - evaluate, KM - Kaplan-Meier, max - maximum, N - no, nc-noncancer, mg/kg - milligram per kilogram, N - no, non-DL - nondioxin-like, nc - based on noncarcinogenic effects, NDL-PCB - nondioxin-like PCB,
PAH - polycyclic aromatic hydrocarbon, PCB - polychlorinated biphenyl, RSL - regional screening level, TBC - To Be Considered, TEQ - toxicity equivalence, UNC - evaluate in Uncertainty Section, USEPA - US Environmental Protection Agency, val - value, Y - yes

Notes
(1) Sediment samples were analyzed for total arsenic; however, the form of arsenic present in sediment is inorganic arsenic. Therefore, it was assumed that all arsenic present in sediment was inorganic arsenic.
(2) Qualifier codes: J - estimated value, U - not detected
(3) The Concentration Used for Screening is the maximum reported concentration for a chemical. For non-detected chemicals, this concentration is equivalent to the maximum detection limit.
(4) For each chemical, the Screening Value is the USEPA residential soil RSL (USEPA 2018, hazard quotient of 0.1, cancer risk level of 1 x 10-6). Some screening values are appropriate toxicity surrogates, when a value for the particular chemical is not available.
(5) Chemicals were screened according to procedures outlined in the risk assessment text. Briefly, detected known human carcinogens were retained; essential nutrients were excluded. Chemicals detected in ≤5% of samples were excluded as COPCs, but flagged for evaluation in the Uncertainty Section if their maximum concentration exceeds the screening value. Non-detected chemicals with detection limits above the screening value are discussed qualitatively for their uncertainty. All DLCs were retained; all 7 cPAHs were retained if at least 1 was a COPC. For the remaining chemicals, if the maximum concentration was ≤ the screening value, they were excluded. Chemicals lacking a screening value are discussed in the Uncertainty Section. Background concentrations were not considered in the screening process, and potential ARAR/TBC values were not relevant.

References
USEPA. 2018. Regional Screening Levels for Chemical Contaminants at Superfund Sites. November. https://www.epa.gov/risk/regional-screening-levels-rsls

TABLE 3-9
RAGS PART D TABLE 2.2: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc/m/nj	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Water																	
	Dioxin-like Compounds																
	1746-01-6	2,3,7,8-TCDD	2.19E-07	J	5.31E-06	J	µg/L	NBN	43	2.41E-07 - 2.81E-06	5.31E-06	J	5.10E-09	nj	Carc	Y	Known human carcinogen
	40321-76-4	1,2,3,7,8-PeCDD	3.53E-07	U	3.62E-06	U	µg/L	NBN	2	3.53E-07 - 3.62E-06	3.62E-06	U	1.20E-07	ca	Carc	Y	Known human carcinogen
	39227-28-6	1,2,3,4,7,8-HxCDD	3.64E-07	U	3.07E-06	U	µg/L	NBN	0	3.64E-07 - 3.07E-06	3.07E-06	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	57653-85-7	1,2,3,6,7,8-HxCDD	3.73E-07	U	3.18E-06	U	µg/L	NBS	4	3.73E-07 - 3.18E-06	3.18E-06	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	19408-74-3	1,2,3,7,8,9-HxCDD	5.80E-07	U	3.61E-06	U	µg/L	NBS	16	4.06E-07 - 3.61E-06	3.61E-06	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	35822-46-9	1,2,3,4,6,7,8-HpCDD	1.05E-06	J	1.66E-05	J	µg/L	NNW	71	4.48E-07 - 1.08E-05	1.66E-05	J	1.20E-05	ca	Carc	Y	Known human carcinogen
	3268-87-9	OCDD	1.05E-05	U	1.94E-04	--	µg/L	NNW	93	8.73E-07 - 4.07E-05	1.94E-04	--	4.00E-04	ca	Carc	Y	Known human carcinogen
	51207-31-9	2,3,7,8-TCDF	2.44E-07	U	2.73E-06	J	µg/L	NBE	4	2.44E-07 - 1.95E-06	2.73E-06	J	1.20E-06	ca	Carc	Y	Known human carcinogen
	57117-41-6	1,2,3,7,8-PeCDF	2.52E-07	U	2.50E-06	U	µg/L	NBN	2	2.52E-07 - 2.50E-06	2.50E-06	U	4.00E-06	ca	Carc	Y	Known human carcinogen
	57117-31-4	2,3,4,7,8-PeCDF	2.33E-07	U	6.46E-06	J	µg/L	NBE	9	2.30E-07 - 2.30E-06	6.46E-06	J	4.00E-07	ca	Carc	Y	Known human carcinogen
	70648-26-9	1,2,3,4,7,8-HxCDF	2.97E-07	U	8.01E-06	J	µg/L	NNW	55	2.48E-07 - 2.34E-06	8.01E-06	J	1.20E-06	ca	Carc	Y	Known human carcinogen
	57117-44-9	1,2,3,6,7,8-HxCDF	2.29E-07	U	2.17E-06	U	µg/L	NBE	15	2.29E-07 - 2.17E-06	2.17E-06	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	72918-21-9	1,2,3,7,8,9-HxCDF	3.25E-07	U	2.64E-06	U	µg/L	NBN	1	3.25E-07 - 2.64E-06	2.64E-06	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	60851-34-5	2,3,4,6,7,8-HxCDF	1.49E-07	J	3.61E-06	U	µg/L	NNW	7	2.55E-07 - 3.61E-06	3.61E-06	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	67562-39-4	1,2,3,4,6,7,8-HpCDF	8.24E-07	J	4.40E-05	--	µg/L	NBN	82	2.39E-07 - 1.39E-05	4.40E-05	--	1.20E-05	ca	Carc	Y	Known human carcinogen
	55673-89-7	1,2,3,4,7,8,9-HpCDF	3.75E-07	U	3.46E-06	U	µg/L	NBN	4	3.75E-07 - 3.46E-06	3.46E-06	U	1.20E-05	ca	Carc	Y	Known human carcinogen
	39001-02-0	OCDF	1.55E-06	J	1.15E-04	--	µg/L	NBN	76	7.29E-07 - 3.36E-05	1.15E-04	--	4.00E-04	ca	Carc	Y	Known human carcinogen
	--	KM TEQ DF	7.98E-07	J	7.30E-06	J	µg/L	NBN	100	-- - --	7.30E-06	J	5.10E-09	nj	Carc	Y	Known human carcinogen
	32598-13-3	PCB-77	4.70E-06	J	6.06E-05	--	µg/L	NNW	99	3.12E-07 - 1.25E-05	6.06E-05	--	6.00E-03	ca	Carc	Y	Known human carcinogen
	70362-50-4	PCB-81	3.50E-07	U	1.31E-05	U	µg/L	NBE	23	3.13E-07 - 1.31E-05	1.31E-05	U	4.00E-04	ca	Carc	Y	Known human carcinogen
	32598-14-4	PCB-105	1.56E-05	J	1.80E-04	--	µg/L	NNW	98	2.86E-07 - 3.35E-05	1.80E-04	--	4.00E-03	ca	Carc	Y	Known human carcinogen
	74472-37-0	PCB-114	4.15E-07	U	1.24E-05	J	µg/L	NNE	83	2.60E-07 - 1.12E-05	1.24E-05	J	4.00E-03	ca	Carc	Y	Known human carcinogen
	31508-00-6	PCB-118	4.55E-05	J	4.28E-04	--	µg/L	NNW	100	2.76E-07 - 1.17E-05	4.28E-04	--	4.00E-03	ca	Carc	Y	Known human carcinogen
	65510-44-3	PCB-123	6.37E-07	J	1.29E-05	J	µg/L	NNE	85	2.97E-07 - 1.24E-05	1.29E-05	J	4.00E-03	ca	Carc	Y	Known human carcinogen
	57465-28-8	PCB-126	3.45E-07	U	1.13E-05	U	µg/L	NBE	20	2.69E-07 - 1.13E-05	1.13E-05	U	1.20E-06	ca	Carc	Y	Known human carcinogen
	--	PCB-156/157	4.35E-06	J	4.95E-05	--	µg/L	NNE	93	5.07E-07 - 2.17E-05	4.95E-05	--	4.00E-03	ca	Carc	Y	Known human carcinogen
	52663-72-6	PCB-167	8.83E-07	U	1.71E-05	J	µg/L	NNE	96	3.09E-07 - 1.34E-05	1.71E-05	J	4.00E-03	ca	Carc	Y	Known human carcinogen
	32774-16-6	PCB-169	3.32E-07	U	1.24E-05	U	µg/L	NBE	2	3.27E-07 - 1.24E-05	1.24E-05	U	4.00E-06	ca	Carc	Y	Known human carcinogen
	39635-31-9	PCB-189	2.62E-07	U	1.56E-05	U	µg/L	NBE	28	2.48E-07 - 1.56E-05	1.56E-05	U	4.00E-03	ca	Carc	Y	Known human carcinogen
	--	KM TEQ PCB	3.82E-08	J	5.52E-07	J	µg/L	NNW	100	-- - --	5.52E-07	J	5.10E-09	nj	Carc	Y	Known human carcinogen
	Non-DL PCBs																
	--	Total Non-DL PCBs	2.28E-03	J	1.51E-02	J	µg/L	NNE	100	-- - --	1.51E-02	J	6.40E-05	nj	--	Y	Max > screening val
	PAHs																
	90-12-0	1-Methylnaphthalene	4.13E-03	J	3.49E-02	--	µg/L	NBE	45	1.00E-02 - 1.00E-02	3.49E-02	--	1.10E+00	ca	--	N	Max ≤ screening val
	832-69-9	1-Methylphenanthrene	7.21E-04	J	1.10E-02	--	µg/L	NNE	90	1.00E-02 - 1.00E-02	1.10E-02	--	1.80E+02	nc	--	N	Max ≤ screening val
	2245-38-7	2,3,5-Trimethylnaphthalene	1.62E-03	J	1.00E-02	U	µg/L	NBE	58	1.00E-02 - 1.00E-02	1.00E-02	U	3.60E+00	nc	--	N	Max ≤ screening val
	91-58-7	2-Chloronaphthalene	4.30E-02	J	2.20E-01	U	µg/L	NBN	1	1.90E-01 - 2.20E-01	2.20E-01	U	7.50E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	91-57-6	2-Methylnaphthalene	8.36E-03	J	2.00E-01	U	µg/L	NBN	35	2.00E-02 - 2.00E-01	2.00E-01	U	3.60E+00	nc	--	N	Max ≤ screening val
	83-32-9	Acenaphthene	3.92E-03	J	2.00E-01	U	µg/L	NBN	99	1.00E-02 - 2.00E-01	2.00E-01	U	5.30E+01	nc	--	N	Max ≤ screening val
	208-96-8	Acenaphthylene	8.56E-04	J	2.00E-01	U	µg/L	NBN	70	1.00E-02 - 2.00E-01	2.00E-01	U	5.30E+01	nc	--	N	Max ≤ screening val
	120-12-7	Anthracene	1.16E-03	J	2.00E-01	U	µg/L	NBN	65	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E+02	nc	--	N	Max ≤ screening val
	56-55-3	Benz(a)anthracene	2.44E-03	J	2.00E-01	U	µg/L	NBN	76	1.00E-02 - 2.00E-01	2.00E-01	U	3.00E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	50-32-8	Benzo(a)pyrene	3.79E-03	J	2.00E-01	U	µg/L	NBN	62	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E-02	nj	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	205-99-2	Benzo(b)fluoranthene	5.69E-03	J	2.00E-01	U	µg/L	NBN	64	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E-01	nj	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	191-24-2	Benzo(g,h,i)perylene	3.19E-03	J	2.00E-01	U	µg/L	NBN	65	1.00E-02 - 2.00E-01	2.00E-01	U	1.20E+01	nc	--	N	Max ≤ screening val
	207-08-9	Benzo(k)fluoranthene	1.98E-03	J	2.00E-01	U	µg/L	NBN	69	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E+00	nj	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	192-97-2	Benzo(e)pyrene	3.09E-03	J	3.95E-02	--	µg/L	NNW	75	1.00E-02 - 1.14E-02	3.95E-02	--	1.20E+01	nc	--	N	Max ≤ screening val
	--	C1-Benzanthracenes/Chrysenes	1.00E-02	U	5.34E-02	J	µg/L	NNW	37	1.00E-02 - 1.00E-02	5.34E-02	J	1.80E+01	nj	--	N	Max ≤ screening val
	--	C1-Dibenzothiophenes	1.00E-02	U	1.00E-02	U	µg/L	NBE	0	1.00E-02 - 1.00E-02	1.00E-02	U	6.50E+00	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-9
RAGS PART D TABLE 2.2: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc/m/nj	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Water																	
	--	C1-Fluoranthenes/Pyrenes	1.00E-02	U	2.73E-02	J	µg/L	NNE	76	1.00E-02 - 1.00E-02	2.73E-02	J	1.20E+01	nc	--	N	Max ≤ screening val
	--	C1-Fluorenes	1.00E-02	U	1.54E-02	J	µg/L	NNE	3	1.00E-02 - 1.00E-02	1.54E-02	J	2.90E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	--	C1-Phenanthrenes/Anthracenes	1.00E-02	U	3.28E-02	J	µg/L	NNE	42	1.00E-02 - 1.00E-02	3.28E-02	J	1.80E+02	nc	--	N	Max ≤ screening val
	--	C1-Pyrene/Fluoranthenes	1.00E-02	U	7.56E-02	J	µg/L	NNE	85	1.00E-02 - 1.00E-02	7.56E-02	J	1.20E+01	nc	--	N	Max ≤ screening val
	--	C2-Benzanthracenes/Chrysenes	1.00E-02	U	2.41E-02	J	µg/L	NNW	7	1.00E-02 - 1.00E-02	2.41E-02	J	1.80E+01	nj	--	N	Max ≤ screening val
	--	C2-Dibenzothiophenes	1.00E-02	U	1.36E-02	J	µg/L	NNE	3	1.00E-02 - 1.00E-02	1.36E-02	J	6.50E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	--	C2-Fluorenes	1.00E-02	U	1.99E-02	J	µg/L	NNE	11	1.00E-02 - 1.00E-02	1.99E-02	J	2.90E+01	nc	--	N	Max ≤ screening val
	--	C2-Naphthalenes	1.00E-02	U	5.08E-02	J	µg/L	NBE	37	1.00E-02 - 1.00E-02	5.08E-02	J	3.60E+00	nc	--	N	Max ≤ screening val
	--	C2-Phenanthrenes/Anthracenes	1.00E-02	U	3.87E-02	J	µg/L	NNE	53	1.00E-02 - 1.00E-02	3.87E-02	J	1.80E+02	nc	--	N	Max ≤ screening val
	--	C3-Benzanthracenes/Chrysenes	1.00E-02	U	1.05E-02	J	µg/L	NNW	1	1.00E-02 - 1.00E-02	1.05E-02	J	1.80E+01	nj	--	N	Detected in ≤5% of samples, max ≤ screening val
	--	C3-Dibenzothiophenes	1.00E-02	U	1.36E-02	J	µg/L	NNE	3	1.00E-02 - 1.00E-02	1.36E-02	J	6.50E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	--	C3-Fluorenes	1.00E-02	U	2.07E-02	J	µg/L	NNE	4	1.00E-02 - 1.00E-02	2.07E-02	J	2.90E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	--	C3-Naphthalenes	1.00E-02	U	2.27E-02	J	µg/L	NBE	33	1.00E-02 - 1.00E-02	2.27E-02	J	3.60E+00	nc	--	N	Max ≤ screening val
	--	C3-Phenanthrenes/Anthracenes	1.00E-02	U	2.80E-02	J	µg/L	NNE	14	1.00E-02 - 1.00E-02	2.80E-02	J	1.80E+02	nc	--	N	Max ≤ screening val
	--	C4-Benzanthracenes/Chrysenes	1.00E-02	U	1.00E-02	U	µg/L	NBE	0	1.00E-02 - 1.00E-02	1.00E-02	U	1.80E+01	nj	--	N	Not detected, max DL ≤ screening val
	--	C4-Dibenzothiophenes	1.00E-02	U	5.03E-02	J	µg/L	NBS	1	1.00E-02 - 1.00E-02	5.03E-02	J	6.50E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	--	C4-Naphthalenes	1.00E-02	U	2.43E-02	J	µg/L	NNE	38	1.00E-02 - 1.00E-02	2.43E-02	J	3.60E+00	nc	--	N	Max ≤ screening val
	--	C4-Phenanthrenes/Anthracenes	1.00E-02	U	1.56E-02	J	µg/L	NNE	3	1.00E-02 - 1.00E-02	1.56E-02	J	1.80E+02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	218-01-9	Chrysene	6.37E-03	J	2.00E-01	U	µg/L	NBN	93	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E+01	nj	--	**Y**	All 7 cPAHs retained since at least 1 is a COPC
	53-70-3	Dibenz(a,h)anthracene	7.88E-04	J	2.00E-01	U	µg/L	NBN	58	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E-02	nj	--	**Y**	All 7 cPAHs retained since at least 1 is a COPC
	206-44-0	Fluoranthene	1.14E-02	--	2.00E-01	U	µg/L	NBN	99	1.00E-02 - 2.00E-01	2.00E-01	U	8.00E+01	nc	--	N	Max ≤ screening val
	86-73-7	Fluorene	2.14E-03	J	2.00E-01	U	µg/L	NBN	50	1.00E-02 - 2.00E-01	2.00E-01	U	2.90E+01	nc	--	N	Max ≤ screening val
	193-39-5	Indeno(1,2,3-c,d)-pyrene	2.13E-03	J	2.00E-01	U	µg/L	NBN	72	1.00E-02 - 2.00E-01	2.00E-01	U	1.80E-01	nj	--	**Y**	All 7 cPAHs retained since at least 1 is a COPC
	91-20-3	Naphthalene	1.60E-02	J	2.00E-01	U	µg/L	NBN	47	5.00E-02 - 2.00E-01	2.00E-01	U	1.70E-01	ca	--	**Y**	Max > screening val
	198-55-0	Perylene	2.04E-03	J	2.21E-02	--	µg/L	NNW	70	1.00E-02 - 1.00E-02	2.21E-02	--	1.20E+01	nc	--	N	Max ≤ screening val
	85-01-8	Phenanthrene	1.15E-02	J	2.00E-01	U	µg/L	NBN	51	2.00E-02 - 2.00E-01	2.00E-01	U	1.80E+02	nc	--	N	Max ≤ screening val
	129-00-0	Pyrene	1.68E-02	J	2.00E-01	U	µg/L	NBN	99	1.00E-02 - 2.00E-01	2.00E-01	U	1.20E+01	nc	--	N	Max ≤ screening val
	Pesticides & Organics																
	75-34-3	1,1-Dichloroethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	2.80E+00	ca	--	N	Not detected, max DL ≤ screening val
	75-35-4	1,1-Dichloroethene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	7.00E+00	m	--	N	Not detected, max DL ≤ screening val
	71-55-6	1,1,1-Trichloroethane	8.00E-02	J	5.00E-01	U	µg/L	NBE	5	5.00E-01 - 5.00E-01	5.00E-01	U	2.00E+02	m	--	N	Max ≤ screening val
	79-00-5	1,1,2-Trichloroethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	4.10E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	79-34-5	1,1,2,2-Tetrachloroethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	7.60E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	96-12-8	1,2-Dibromo-3-chloropropane	2.00E+00	U	2.00E+00	U	µg/L	NBE	0	2.00E+00 - 2.00E+00	2.00E+00	U	3.30E-04	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	106-93-4	1,2-Dibromoethane	2.00E+00	U	2.00E+00	U	µg/L	NBE	0	2.00E+00 - 2.00E+00	2.00E+00	U	7.50E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	95-50-1	1,2-Dichlorobenzene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	3.00E+01	nc	--	N	Not detected, max DL ≤ screening val
	107-06-2	1,2-Dichloroethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	1.70E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	78-87-5	1,2-Dichloropropane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	8.20E-01	nc	--	N	Not detected, max DL ≤ screening val
	87-61-6	1,2,3-Trichlorobenzene	2.00E+00	U	2.00E+00	U	µg/L	NBE	0	2.00E+00 - 2.00E+00	2.00E+00	U	7.00E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	120-82-1	1,2,4-Trichlorobenzene	1.30E-01	J	2.00E+00	U	µg/L	NBE	1	2.00E+00 - 2.00E+00	2.00E+00	U	4.00E-01	nc	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	95-94-3	1,2,4,5-Tetrachlorobenzene	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	1.70E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	541-73-1	1,3-Dichlorobenzene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	3.00E+01	nc	--	N	Not detected, max DL ≤ screening val
	106-46-7	1,4-Dichlorobenzene	1.20E-01	J	5.00E-01	U	µg/L	NBE	1	5.00E-01 - 5.00E-01	5.00E-01	U	4.80E-01	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	123-91-1	1,4-Dioxane	1.90E+00	U	2.20E+00	U	µg/L	NBN	0	1.90E+00 - 2.20E+00	2.20E+00	U	4.60E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	95-57-8	2-Chlorophenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	9.10E+00	nc	--	N	Not detected, max DL ≤ screening val
	591-78-6	2-Hexanone	2.00E+01	U	2.00E+01	U	µg/L	NBE	0	2.00E+01 - 2.00E+01	2.00E+01	U	3.80E+00	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	88-74-4	2-Nitroaniline	4.70E+00	U	5.40E+00	U	µg/L	NBN	0	4.70E+00 - 5.40E+00	5.40E+00	U	1.90E+01	nc	--	N	Not detected, max DL ≤ screening val
	88-75-5	2-Nitrophenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	5.80E+02	nc	--	N	Not detected, max DL ≤ screening val
	58-90-2	2,3,4,6-Tetrachlorophenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	2.40E+01	nc	--	N	Not detected, max DL ≤ screening val
	120-83-2	2,4-Dichlorophenol	3.80E-02	J	2.20E-01	U	µg/L	NBN	1	1.90E-01 - 2.20E-01	2.20E-01	U	4.60E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val

TABLE 3-9
RAGS PART D TABLE 2.2: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc/m/nj	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Water																	
	105-67-9	2,4-Dimethylphenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	3.60E+01	nc	--	N	Not detected, max DL ≤ screening val
	51-28-5	2,4-Dinitrophenol	4.70E+00	U	5.40E+00	U	µg/L	NBN	0	4.70E+00 - 5.40E+00	5.40E+00	U	3.90E+00	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	121-14-2	2,4-Dinitrotoluene	2.10E-01	J	1.10E+00	U	µg/L	NBN	1	9.40E-01 - 1.10E+00	1.10E+00	U	2.40E-01	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	95-95-4	2,4,5-Trichlorophenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	1.20E+02	nc	--	N	Not detected, max DL ≤ screening val
	88-06-2	2,4,6-Trichlorophenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	1.00E+00	nj	--	UNC	Not detected, max DL > screening val; eval uncertainty
	53-19-0	2,4'-DDD	1.91E-05	U	3.30E-04	J	µg/L	NNW	81	1.52E-05 - 4.10E-04	3.30E-04	J	3.10E-04	nj	--	**Y**	Max > screening val
	3424-82-6	2,4'-DDE	1.99E-05	U	4.91E-04	U	µg/L	NBN	40	1.99E-05 - 4.91E-04	4.91E-04	U	2.20E-04	nj	--	**Y**	Max > screening val
	789-02-6	2,4'-DDT	2.08E-05	U	4.10E-04	U	µg/L	NNW	5	2.08E-05 - 4.10E-04	4.10E-04	U	2.20E-04	nj	--	**Y**	Max > screening val
	581-42-0	2,6-Dimethylnaphthalene	2.29E-03	J	2.06E-02	--	µg/L	NBE	71	1.00E-02 - 1.00E-02	2.06E-02	--	3.60E+00	nc	--	N	Max ≤ screening val
	606-20-2	2,6-Dinitrotoluene	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	4.90E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	99-09-2	3-Nitroaniline	4.70E+00	U	5.40E+00	U	µg/L	NBN	0	4.70E+00 - 5.40E+00	5.40E+00	U	1.90E+01	nc	--	N	Not detected, max DL ≤ screening val
	91-94-1	3,3'-Dichlorobenzidine	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	2.80E-02	nj	--	UNC	Not detected, max DL > screening val; eval uncertainty
	101-55-3	4-Bromophenyl phenyl ether	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	59-50-7	4-Chloro-3-methylphenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	1.40E+02	nc	--	N	Not detected, max DL ≤ screening val
	106-47-8	4-Chloroaniline	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	3.70E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	7005-72-3	4-Chlorophenyl phenyl ether	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	108-10-1	4-Methyl-2-pentanone	2.00E+01	U	2.00E+01	U	µg/L	NBE	0	2.00E+01 - 2.00E+01	2.00E+01	U	6.30E+02	nc	--	N	Not detected, max DL ≤ screening val
	106-44-5	4-Methylphenol	8.90E-02	J	1.10E+00	U	µg/L	NBN	1	9.40E-01 - 1.10E+00	1.10E+00	U	1.90E+02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	100-01-6	4-Nitroaniline	4.70E+00	U	5.40E+00	U	µg/L	NBN	0	4.70E+00 - 5.40E+00	5.40E+00	U	3.80E+00	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	100-02-7	4-Nitrophenol	4.70E+00	U	5.40E+00	U	µg/L	NBN	0	4.70E+00 - 5.40E+00	5.40E+00	U	5.80E+02	nc	--	N	Not detected, max DL ≤ screening val
	72-54-8	4,4'-DDD	7.11E-05	U	9.00E-04	--	µg/L	NNW	86	1.99E-05 - 4.30E-04	9.00E-04	--	3.10E-04	nj	--	**Y**	Max > screening val
	72-55-9	4,4'-DDE	4.50E-05	U	1.20E-03	--	µg/L	NNW	79	3.72E-05 - 6.86E-04	1.20E-03	--	2.20E-04	nj	--	**Y**	Max > screening val
	50-29-3	4,4'-DDT	2.64E-05	U	6.40E-04	--	µg/L	NNW	52	2.64E-05 - 4.10E-04	6.40E-04	--	2.20E-04	nj	--	**Y**	Max > screening val
	534-52-1	4,6-Dinitro-2-methylphenol	4.70E+00	U	5.40E+00	U	µg/L	NBN	0	4.70E+00 - 5.40E+00	5.40E+00	U	1.50E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	67-64-1	Acetone	2.00E+01	U	2.00E+01	U	µg/L	NBE	0	2.00E+01 - 2.00E+01	2.00E+01	U	1.40E+03	nc	--	N	Not detected, max DL ≤ screening val
	98-86-2	Acetophenone	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	1.90E+02	nc	--	N	Not detected, max DL ≤ screening val
	309-00-2	Aldrin	3.98E-06	U	4.10E-04	U	µg/L	NNW	10	3.98E-06 - 4.10E-04	4.10E-04	U	5.00E-05	nj	--	**Y**	Max > screening val
	319-84-6	alpha-BHC	4.70E-05	U	7.60E-04	--	µg/L	NBS	85	3.64E-06 - 4.10E-04	7.60E-04	--	4.90E-03	nj	--	N	Max ≤ screening val
	1912-24-9	Atrazine	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	3.00E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	100-52-7	Benzaldehyde	2.40E-01	J	1.10E+00	U	µg/L	NBN	7	9.40E-01 - 1.10E+00	1.10E+00	U	1.90E+01	ca	--	N	Max ≤ screening val
	71-43-2	Benzene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	4.60E-01	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	319-85-7	beta-BHC	2.16E-05	U	4.90E-04	--	µg/L	NBS	69	6.33E-06 - 4.10E-04	4.90E-04	--	1.70E-02	nj	--	N	Max ≤ screening val
	92-52-4	Biphenyl	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	8.30E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	108-60-1	Bis(2-chloro-1-methylethyl) ether	4.50E-02	J	2.20E-01	U	µg/L	NBN	1	1.90E-01 - 2.20E-01	2.20E-01	U	7.10E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	111-91-1	Bis(2-chloroethoxy)methane	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	5.90E+00	nc	--	N	Not detected, max DL ≤ screening val
	111-44-4	Bis(2-chloroethyl)ether	1.90E-01	U	2.20E-01	U	µg/L	NBN	0	1.90E-01 - 2.20E-01	2.20E-01	U	1.40E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	117-81-7	Bis(2-ethylhexyl)phthalate	1.90E+00	U	2.70E+00	--	µg/L	NBE	4	1.90E+00 - 2.20E+00	2.70E+00	--	2.20E+00	nj	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	74-97-5	Bromochloromethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	8.30E+00	nc	--	N	Not detected, max DL ≤ screening val
	75-25-2	Bromoform	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	3.30E+00	ca	--	N	Not detected, max DL ≤ screening val
	85-68-7	Butyl benzyl phthalate	1.40E-01	J	1.10E+00	U	µg/L	NNE	32	9.40E-01 - 1.10E+00	1.10E+00	U	1.60E+01	ca	--	N	Max ≤ screening val
	105-60-2	Caprolactam	1.40E+00	J	5.40E+00	U	µg/L	NBN	4	4.70E+00 - 5.40E+00	5.40E+00	U	9.90E+02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	86-74-8	Carbazole	4.70E-02	J	2.20E-01	U	µg/L	NBN	1	1.90E-01 - 2.20E-01	2.20E-01	U	2.90E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	75-15-0	Carbon disulfide	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	8.10E+01	nc	--	N	Not detected, max DL ≤ screening val
	56-23-5	Carbon tetrachloride	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	4.60E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	5103-71-9	Chlordane, alpha (cis)	5.80E-05	J	5.32E-04	--	µg/L	NNE	100	7.27E-06 - 4.10E-04	5.32E-04	--	2.00E-02	ca	--	N	Max ≤ screening val
	5103-74-2	Chlordane, gamma (trans)	6.20E-05	J	4.10E-04	--	µg/L	NNW	93	6.45E-06 - 4.10E-04	4.10E-04	--	2.00E-02	ca	--	N	Max ≤ screening val
	108-90-7	Chlorobenzene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	7.80E+00	nc	--	N	Not detected, max DL ≤ screening val
	124-48-1	Chlorodibromomethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	8.70E-01	ca	--	N	Not detected, max DL ≤ screening val
	75-00-3	Chloroethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	2.10E+03	nc	--	N	Not detected, max DL ≤ screening val
	67-66-3	Chloroform	9.00E-02	J	5.00E-01	U	µg/L	NBE	36	5.00E-01 - 5.00E-01	5.00E-01	U	2.20E-01	ca	--	**Y**	Max > screening val

TABLE 3-9
RAGS PART D TABLE 2.2: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc/m/nj	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Water																	
	156-59-2	cis-1,2-Dichloroethylene	7.00E-02	J	1.90E-01	J	µg/L	NBS	100	5.00E-01 - 5.00E-01	1.90E-01	J	3.60E+00	nc	--	N	Max ≤ screening val
	10061-01-5	cis-1,3-Dichloropropene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	4.70E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	110-82-7	Cyclohexane	1.00E+00	U	1.00E+00	U	µg/L	NBE	0	1.00E+00 - 1.00E+00	1.00E+00	U	1.30E+03	nc	--	N	Not detected, max DL ≤ screening val
	319-86-8	Delta-BHC	6.88E-06	U	4.10E-04	U	µg/L	NNW	15	6.28E-06 - 4.10E-04	4.10E-04	U	4.90E-03	nj	--	N	Max ≤ screening val
	84-74-2	Di-n-butyl phthalate	1.30E-01	J	1.10E+00	U	µg/L	NBN	4	9.40E-01 - 1.10E+00	1.10E+00	U	9.00E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	117-84-0	Di-n-octyl phthalate	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	2.00E+01	nc	--	N	Not detected, max DL ≤ screening val
	132-64-9	Dibenzofuran	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	7.90E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	132-65-0	Dibenzothiophene	6.93E-04	J	1.00E-02	U	µg/L	NBE	73	1.00E-02 - 1.00E-02	1.00E-02	U	6.50E+00	nc	--	N	Max ≤ screening val
	14488-53-0	Dibutyltin Ion	5.00E-02	U	5.00E-02	U	µg/L	NBE	0	5.00E-02 - 5.00E-02	5.00E-02	U	6.00E-01	nc	--	N	Not detected, max DL ≤ screening val
	75-27-4	Dichlorobromomethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	1.30E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	75-71-8	Dichlorodifluoromethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	2.00E+01	nc	--	N	Not detected, max DL ≤ screening val
	60-57-1	Dieldrin	1.60E-04	J	9.87E-04	--	µg/L	NNE	96	8.19E-06 - 4.10E-04	9.87E-04	--	5.40E-05	nj	--	**Y**	Max > screening val
	84-66-2	Diethyl phthalate	1.40E-01	J	1.10E+00	U	µg/L	NBN	16	9.40E-01 - 1.10E+00	1.10E+00	U	1.50E+03	nc	--	N	Max ≤ screening val
	131-11-3	Dimethyl phthalate	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	1.50E+03	nc	--	N	Not detected, max DL ≤ screening val
	959-98-8	Endosulfan I	1.83E-05	U	4.95E-04	U	µg/L	NBS	7	1.83E-05 - 4.95E-04	4.95E-04	U	1.00E+01	nc	--	N	Max ≤ screening val
	33213-65-9	Endosulfan II	3.65E-05	U	5.39E-04	U	µg/L	NNE	5	3.65E-05 - 5.39E-04	5.39E-04	U	1.00E+01	nc	--	N	Max ≤ screening val
	1031-07-8	Endosulfan sulfate	1.06E-05	U	1.80E-04	J	µg/L	NBS	49	4.64E-06 - 4.10E-04	1.80E-04	J	1.00E+01	nc	--	N	Max ≤ screening val
	72-20-8	Endrin	8.43E-06	U	4.60E-04	--	µg/L	NBE	16	8.43E-06 - 4.10E-04	4.60E-04	--	6.00E-02	nj	--	N	Max ≤ screening val
	7421-93-4	Endrin aldehyde	1.40E-05	U	4.10E-04	U	µg/L	NNW	7	1.40E-05 - 4.10E-04	4.10E-04	U	6.00E-02	nj	--	N	Max ≤ screening val
	53494-70-5	Endrin ketone	1.60E-05	J	4.10E-04	U	µg/L	NNW	30	1.67E-05 - 4.10E-04	4.10E-04	U	6.00E-02	nj	--	N	Max ≤ screening val
	100-41-4	Ethylbenzene	5.00E-02	J	5.00E-01	U	µg/L	NBE	3	5.00E-01 - 5.00E-01	5.00E-01	U	1.50E+00	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	58-89-9	Gamma-BHC (Lindane)	1.90E-05	U	3.90E-04	U	µg/L	NNW	76	5.51E-06 - 4.10E-04	3.90E-04	U	4.20E-02	ca	--	N	Max ≤ screening val
	76-44-8	Heptachlor	1.85E-06	U	4.10E-04	U	µg/L	NNW	34	1.84E-06 - 4.10E-04	4.10E-04	U	7.90E-05	nj	--	**Y**	Max > screening val
	1024-57-3	Heptachlor epoxide, cis-	6.30E-05	J	4.74E-04	--	µg/L	NNE	91	3.97E-06 - 4.10E-04	4.74E-04	--	3.90E-05	nj	--	**Y**	Max > screening val
	118-74-1	Hexachlorobenzene	3.32E-05	U	5.10E-04	U	µg/L	NNW	7	2.21E-06 - 5.10E-04	5.10E-04	U	2.90E-04	nj	--	**Y**	Max > screening val
	87-68-3	Hexachlorobutadiene	1.90E-01	U	2.20E-01	U	µg/L	NBN	0	1.90E-01 - 2.20E-01	2.20E-01	U	1.40E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	77-47-4	Hexachlorocyclopentadiene	9.40E-01	U	1.10E+00	U	µg/L	NNE	0	9.40E-01 - 1.10E+00	1.10E+00	U	4.10E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	67-72-1	Hexachloroethane	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	3.30E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	78-59-1	Isophorone	6.50E-02	J	1.10E+00	U	µg/L	NBN	1	9.40E-01 - 1.10E+00	1.10E+00	U	7.80E+01	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	98-82-8	Isopropylbenzene	2.00E+00	U	2.00E+00	U	µg/L	NBE	0	2.00E+00 - 2.00E+00	2.00E+00	U	4.50E+01	nc	--	N	Not detected, max DL ≤ screening val
	179601-23-1	m,p-Xylenes	1.10E-01	J	5.00E-01	U	µg/L	NBE	12	5.00E-01 - 5.00E-01	5.00E-01	U	1.90E+01	nc	--	N	Max ≤ screening val
	72-43-5	Methoxychlor	1.07E-05	U	4.30E-04	J	µg/L	NNW	23	8.28E-06 - 4.10E-04	4.30E-04	J	3.70E+00	nc	--	N	Max ≤ screening val
	79-20-9	Methyl acetate	1.00E+00	U	1.00E+00	U	µg/L	NBE	0	1.00E+00 - 1.00E+00	1.00E+00	U	2.00E+03	nc	--	N	Not detected, max DL ≤ screening val
	74-83-9	Methyl bromide	1.10E-01	J	5.00E-01	U	µg/L	NBE	1	5.00E-01 - 5.00E-01	5.00E-01	U	7.50E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	74-87-3	Methyl chloride	7.00E-02	J	5.00E-01	U	µg/L	NBE	24	5.00E-01 - 5.00E-01	5.00E-01	U	1.90E+01	nc	--	N	Max ≤ screening val
	78-93-3	Methyl ethyl ketone	2.00E+01	U	2.00E+01	U	µg/L	NBE	0	2.00E+01 - 2.00E+01	2.00E+01	U	5.60E+02	nc	--	N	Not detected, max DL ≤ screening val
	1634-04-4	Methyl-t-butyl ether	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	1.40E+01	ca	--	N	Not detected, max DL ≤ screening val
	108-87-2	Methylcyclohexane	1.00E+00	U	1.00E+00	U	µg/L	NBE	0	1.00E+00 - 1.00E+00	1.00E+00	U	1.30E+03	nc	--	N	Not detected, max DL ≤ screening val
	75-09-2	Methylene chloride	1.20E-01	J	2.00E+00	U	µg/L	NBE	3	2.00E+00 - 2.00E+00	2.00E+00	U	5.00E+00	m	--	N	Detected in ≤5% of samples, max ≤ screening val
	78763-54-9	Monobutyltin	5.00E-02	U	8.40E-02	--	µg/L	NBE	1	5.00E-02 - 5.00E-02	8.40E-02	--	6.00E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	621-64-7	N-nitroso-di-n-propylamine	1.90E-01	U	2.20E-01	U	µg/L	NBN	0	1.90E-01 - 2.20E-01	2.20E-01	U	1.10E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	86-30-6	N-Nitrosodiphenylamine	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	6.00E+00	nj	--	N	Not detected, max DL ≤ screening val
	98-95-3	Nitrobenzene	1.90E+00	U	2.20E+00	U	µg/L	NBN	0	1.90E+00 - 2.20E+00	2.20E+00	U	1.40E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	5103-73-1	Nonachlor, cis-	1.24E-05	U	4.00E-04	U	µg/L	NNE	58	1.24E-05 - 4.10E-04	4.00E-04	U	2.00E-02	ca	--	N	Max ≤ screening val
	39765-80-5	Nonachlor, trans-	2.68E-05	J	4.00E-04	U	µg/L	NNE	96	7.94E-06 - 4.10E-04	4.00E-04	U	2.00E-02	ca	--	N	Max ≤ screening val
	95-48-7	o-Cresol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	9.30E+01	nc	--	N	Not detected, max DL ≤ screening val
	95-47-6	o-Xylene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	1.90E+01	nc	--	N	Not detected, max DL ≤ screening val
	27304-13-8	Oxychlordane	4.89E-06	U	4.10E-04	U	µg/L	NNW	10	4.89E-06 - 4.10E-04	4.10E-04	U	2.00E-02	ca	--	N	Max ≤ screening val
	87-86-5	Pentachlorophenol	9.40E-01	U	1.10E+00	U	µg/L	NBN	0	9.40E-01 - 1.10E+00	1.10E+00	U	4.10E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	108-95-2	Phenol	6.20E-02	J	2.20E-01	U	µg/L	NBN	1	1.90E-01 - 2.20E-01	2.20E-01	U	5.80E+02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val

TABLE 3-9
RAGS PART D TABLE 2.2: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc/m/nj	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Water																	
	100-42-5	Styrene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	1.00E+02	m	--	N	Not detected, max DL ≤ screening val
	1461-25-2	Tetrabutyltin	5.00E-02	U	5.00E-02	U	µg/L	NBE	0	5.00E-02 - 5.00E-02	5.00E-02	U	6.00E-01	nc	--	N	Not detected, max DL ≤ screening val
	127-18-4	Tetrachloroethylene	1.00E-01	J	5.00E-01	U	µg/L	NBE	53	5.00E-01 - 5.00E-01	5.00E-01	U	1.60E+00	nj	--	N	Max ≤ screening val
	108-88-3	Toluene	7.00E-02	J	5.30E-01	U	µg/L	NNE	5	5.00E-01 - 5.30E-01	5.30E-01	U	1.10E+02	nc	--	N	Max ≤ screening val
	156-60-5	Trans-1,2,-dichloroethene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	3.60E+01	nc	--	N	Not detected, max DL ≤ screening val
	10061-02-6	Trans-1,3-dichloropropene	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	4.70E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	688-73-3	Tri-n-butyltin hydride	5.00E-02	U	5.00E-02	U	µg/L	NBE	0	5.00E-02 - 5.00E-02	5.00E-02	U	3.70E-01	nc	--	N	Not detected, max DL ≤ screening val
	36643-28-4	Tributyltin	5.00E-02	U	5.00E-02	U	µg/L	NBE	0	5.00E-02 - 5.00E-02	5.00E-02	U	6.00E-01	nc	--	N	Not detected, max DL ≤ screening val
	79-01-6	Trichloroethylene	1.00E-01	J	5.00E-01	U	µg/L	NBE	54	5.00E-01 - 5.00E-01	5.00E-01	U	2.80E-01	nc	Carc	**Y**	Known human carcinogen
	75-69-4	Trichlorofluoromethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	5.20E+02	nc	--	N	Not detected, max DL ≤ screening val
	26523-64-8	Trichlorotrifluoroethane	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	5.20E+02	nc	--	N	Not detected, max DL ≤ screening val
	75-01-4	Vinyl chloride	5.00E-01	U	5.00E-01	U	µg/L	NBE	0	5.00E-01 - 5.00E-01	5.00E-01	U	1.90E-02	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Inorganics																
	7429-90-5	Aluminum	4.16E+01	J	9.74E+02	--	µg/L	NNW	100	2.00E+00 - 5.00E+01	9.74E+02	--	2.00E+03	nc	--	N	Max ≤ screening val
	7440-36-0	Antimony	4.20E-01	J	1.35E+00	--	µg/L	NBE	19	1.00E+00 - 1.00E+00	1.35E+00	--	7.80E-01	nc	--	**Y**	Max > screening val
	7440-38-2	Arsenic, inorganic	7.30E-01	--	1.84E+00	--	µg/L	NNW	100	5.00E-01 - 5.00E-01	1.84E+00	--	5.20E-02	ca	Carc	**Y**	Known human carcinogen
	7440-39-3	Barium	1.65E+01	--	3.76E+01	--	µg/L	NBN	100	2.00E+00 - 2.50E+00	3.76E+01	--	3.80E+02	nc	--	N	Max ≤ screening val
	7440-41-7	Beryllium	3.80E-03	J	1.24E-01	--	µg/L	NNE	28	2.00E-02 - 2.00E-02	1.24E-01	--	2.50E+00	nc	--	N	Max ≤ screening val
	7440-43-9	Cadmium	2.70E-02	--	2.33E-01	--	µg/L	NBN	100	2.00E-02 - 2.00E-02	2.33E-01	--	9.20E-01	nc	--	N	Max ≤ screening val
	7440-70-2	Calcium	1.43E+05	--	2.77E+05	--	µg/L	NBS	100	5.00E+01 - 2.50E+03	2.77E+05	--	Essential nutrient	--	--	N	Essential nutrient
	16887-00-6	Chloride	4.09E+06	--	1.39E+07	--	µg/L	NNW	100	2.00E+05 - 5.00E+05	1.39E+07	--	Essential nutrient	--	--	N	Essential nutrient
	7440-47-3	Chromium [as Cr(III)]	4.30E-01	--	5.61E+00	--	µg/L	NNW	100	2.00E-01 - 2.00E-01	5.61E+00	--	3.50E-02	ca	Carc	**Y**	Known human carcinogen
	18540-29-9	Chromium (VI)	2.00E-02	U	1.19E+00	U	µg/L	NBE	49	2.00E-02 - 1.19E+00	1.19E+00	U	3.50E-02	ca	Carc	**Y**	Known human carcinogen
	7440-48-4	Cobalt	9.80E-02	--	4.73E-01	--	µg/L	NNW	100	2.00E-02 - 2.00E-02	4.73E-01	--	6.00E-01	nc	--	N	Max ≤ screening val
	7440-50-8	Copper	1.29E+00	--	8.09E+00	--	µg/L	NNW	100	1.00E-01 - 1.00E-01	8.09E+00	--	8.00E+01	nc	--	N	Max ≤ screening val
	57-12-5	Cyanide	8.00E+00	J	1.00E+01	U	µg/L	NBE	1	1.00E+01 - 1.00E+01	1.00E+01	U	1.50E-01	nc	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	7439-89-6	Iron	1.30E+02	J	2.32E+03	--	µg/L	NNW	100	1.00E+01 - 1.00E+01	2.32E+03	--	1.40E+03	nc	--	**Y**	Max > screening val
	7439-92-1	Lead	5.33E-01	--	8.50E+00	--	µg/L	NNW	100	2.00E-02 - 2.00E-02	8.50E+00	--	1.50E+01	nc	--	N	Max ≤ screening val
	7439-95-4	Magnesium	3.86E+05	--	8.14E+05	--	µg/L	NBS	100	2.00E+02 - 1.00E+03	8.14E+05	--	Essential nutrient	--	--	N	Essential nutrient
	7439-96-5	Manganese	2.89E+01	J	1.17E+02	--	µg/L	NBN	100	6.00E-01 - 6.00E-01	1.17E+02	--	4.30E+01	nc	--	**Y**	Max > screening val
	7439-97-6	Mercury	1.70E-03	J	7.63E-02	--	µg/L	NNW	100	3.90E-04 - 1.47E-02	7.63E-02	--	5.10E-02	nj	--	**Y**	Max > screening val
	22967-92-6	Methyl Mercury	2.20E-05	J	2.94E-04	--	µg/L	NNW	89	4.80E-05 - 5.20E-05	2.94E-04	--	2.00E-01	nc	--	N	Max ≤ screening val
	7440-02-0	Nickel	8.90E-01	--	2.41E+00	--	µg/L	NNW	100	2.00E-01 - 2.00E-01	2.41E+00	--	3.90E+01	nc	--	N	Max ≤ screening val
	7723-14-0	Phosphorus	7.90E+01	--	2.63E+02	--	µg/L	NNE	100	1.00E+01 - 1.00E+01	2.63E+02	--	Essential nutrient	--	--	N	Essential nutrient
	7440-09-7	Potassium	1.27E+05	--	2.59E+05	--	µg/L	NBN	100	1.00E+02 - 2.00E+04	2.59E+05	--	Essential nutrient	--	--	N	Essential nutrient
	7782-49-2	Selenium	2.00E-01	J	1.00E+00	U	µg/L	NBE	16	1.00E+00 - 1.00E+00	1.00E+00	U	1.00E+01	nc	--	N	Max ≤ screening val
	7440-22-4	Silver	4.00E-03	J	8.38E-01	--	µg/L	NBN	86	2.00E-02 - 2.00E-02	8.38E-01	--	9.40E+00	nc	--	N	Max ≤ screening val
	7440-23-5	Sodium	3.25E+06	--	6.88E+06	--	µg/L	NBN	100	2.00E+03 - 4.00E+04	6.88E+06	--	Essential nutrient	--	--	N	Essential nutrient
	18496-25-8	Sulfide	4.00E+02	J	2.00E+03	U	µg/L	NBE	2	2.00E+03 - 2.00E+03	2.00E+03	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	7440-28-0	Thallium	6.00E-03	J	4.80E-02	--	µg/L	NBE	51	2.00E-02 - 2.00E-02	4.80E-02	--	2.00E-02	nc	--	**Y**	Max > screening val
	7440-32-6	Titanium	7.00E-01	J	4.33E+01	J	µg/L	NNW	80	1.00E+00 - 3.00E+01	4.33E+01	J	2.10E-02	nc	--	**Y**	Max > screening val
	7440-62-2	Vanadium	1.70E+00	J	7.10E+00	--	µg/L	NBS	86	2.00E+00 - 2.00E+00	7.10E+00	--	8.60E+00	nc	--	N	Max ≤ screening val
	7440-66-6	Zinc	4.09E+00	--	2.06E+01	--	µg/L	NNW	100	5.00E-01 - 5.00E-01	2.06E+01	--	6.00E+02	nc	--	N	Max ≤ screening val

Definitions

ARAR - Applicable or Relevant and Appropriate Requirements, ca - based on carcinogenic effects, Carc - known human carcinogen, chem - chemical, chems - chemicals, COPC - chemical of potential concern, cPAH - carcinogenic PAH, DF - dioxin/furan, DL - detection limit, DLC - dioxin-like compound, eval - evaluate, gen - general, ID - identify,
KM - Kaplan-Meier, max - maximum, nc-noncancer, non-DL - nondioxin-like, m - federal MCL, MCL - maximum contaminant level, nc - based on noncarcinogenic effects, N - no, NBE - Newark Bay east, NBN - Newark Bay north, NBS - Newark Bay south, NDL-PCB - nondioxin-like PCB, NNE - north-northeast, NNW - north-northwest,
NJ - based on New Jersey Department of Environmental Protection Surface Water Quality Criteria for Human Health, Saline Water, param - parameter, PAH - polycyclic aromatic hydrocarbon, PCB - polychlorinated biphenyl, RSL - regional screening level, SV - small volume, TBC - To Be Considered, TEQ - toxicity equivalence,
µg/L - microgram per liter, UNC - evaluate in Uncertainty Section, USEPA - US Environmental Protection Agency, UNC - evaluate in Uncertainty Section, val - value, Y - yes

TABLE 3-9
RAGS PART D TABLE 2.2: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value Value (4)	ca/nc/m/nj	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Surface Water																	

Notes
(1) Surface water samples were analyzed for total arsenic; however, the form of arsenic present in surface water is inorganic arsenic. Therefore, it was assumed that all arsenic present in surfact water was inorganic arsenic.
(2) Qualifier codes: J - estimated value, U - not detected
(3) The Concentration Used for Screening is the maximum reported concentration for a chemical. For non-detected chemicals, this concentration is equivalent to the maximum detection limit.
(4) For each chemical, the Screening Value is the lowest of the USEPA tap water RSL (USEPA 2018, hazard quotient of 0.1, cancer risk level of 1 x 10-6), MCL, or NJDEP Surface Water Criteria value. Some screening values are appropriate toxicity surrogates, when a value for the particular chemical is not available.
(5) Chemicals were screened according to procedures outlined in the risk assessment text. Briefly, detected known human carcinogens were retained; essential nutrients were excluded. Chemicals detected in ≤5% of samples were excluded as COPCs, but flagged for evaluation in the Uncertainty Section if their maximum concentration exceeds the screening value. Non-detected chemicals with detection limits above the screening value are discussed qualitatively for their uncertainty. All DLCs were retained; all 7 cPAHs were retained if at least 1 was a COPC. For the remaining chemicals, if the maximum concentration was ≤ the screening value, they were excluded. Chemicals lacking a screening value are discussed in the Uncertainty Section. Background concentrations were not considered in the screening process, and potential ARAR/TBC values were not relevant.

Reference
USEPA. 2018. Regional Screening Levels for Chemical Contaminants at Superfund Sites. November. https://www.epa.gov/risk/regional-screening-levels-rsls

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Dioxin-like Compounds																				
	Fish	Fillet	American Eel	1746-01-6	2,3,7,8-TCDD	5.66E-08	U	1.47E-05	–	mg/kg	North	NA	94	3.44E-08 - 1.18E-07	1.47E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	40321-76-4	1,2,3,7,8-PeCDD	1.22E-07	U	1.26E-06	J	mg/kg	South	NA	83	3.53E-08 - 2.30E-07	1.26E-06	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	39227-28-6	1,2,3,4,7,8-HxCDD	7.57E-08	U	9.32E-07	J	mg/kg	Central	NA	94	2.16E-08 - 8.38E-08	9.32E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	57653-85-7	1,2,3,6,7,8-HxCDD	3.69E-07	J	3.76E-06	J	mg/kg	South	NA	100	2.39E-08 - 9.21E-08	3.76E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	19408-74-3	1,2,3,7,8,9-HxCDD	5.06E-08	J	7.60E-07	J	mg/kg	South	NA	100	1.98E-08 - 8.94E-08	7.60E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	35822-46-9	1,2,3,4,6,7,8-HpCDD	1.46E-07	J	2.85E-06	J	mg/kg	South	NA	100	1.57E-08 - 6.99E-08	2.85E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	3268-87-9	OCDD	3.11E-07	J	1.23E-05	J	mg/kg	Central	NA	100	1.41E-08 - 3.70E-08	1.23E-05	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	51207-31-9	2,3,7,8-TCDF	5.64E-08	J	2.61E-07	U	mg/kg	North	NA	22	3.65E-08 - 2.61E-07	2.61E-07	U	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	57117-41-6	1,2,3,7,8-PeCDF	1.08E-07	U	3.25E-06	J	mg/kg	South	NA	94	2.02E-08 - 1.21E-07	3.25E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	57117-31-4	2,3,4,7,8-PeCDF	6.84E-07	J	9.23E-06	J	mg/kg	North	NA	100	1.86E-08 - 1.14E-07	9.23E-06	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	70648-26-9	1,2,3,4,7,8-HxCDF	1.84E-07	J	4.71E-06	J	mg/kg	North	NA	100	2.40E-08 - 9.09E-08	4.71E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	57117-44-9	1,2,3,6,7,8-HxCDF	3.97E-07	J	3.85E-06	J	mg/kg	North	NA	100	2.31E-08 - 8.74E-08	3.85E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	72918-21-9	1,2,3,7,8,9-HxCDF	4.59E-08	J	2.54E-07	J	mg/kg	South	NA	78	2.53E-08 - 9.47E-08	2.54E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	60851-34-5	2,3,4,6,7,8-HxCDF	8.97E-08	J	6.30E-07	J	mg/kg	South	NA	100	2.33E-08 - 8.49E-08	6.30E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	67562-39-4	1,2,3,4,6,7,8-HpCDF	5.41E-07	J	8.58E-06	J	mg/kg	North	NA	100	2.43E-08 - 1.43E-07	8.58E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	55673-89-7	1,2,3,4,7,8,9-HpCDF	3.72E-08	J	2.62E-07	J	mg/kg	Central	NA	83	3.05E-08 - 1.70E-07	2.62E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	39001-02-0	OCDF	8.21E-08	J	6.77E-07	J	mg/kg	Central	NA	100	1.91E-08 - 7.39E-08	6.77E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	–	KM TEQ DF	3.98E-07	J	1.96E-05	–	mg/kg	North	NA	100	-	1.96E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	32598-13-3	PCB-77	1.01E-05	J	1.40E-04	–	mg/kg	South	NA	100	1.36E-06 - 7.00E-06	1.40E-04	–	3.20E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	70362-50-4	PCB-81	1.75E-06	U	3.47E-05	–	mg/kg	South	NA	29	1.75E-06 - 8.97E-06	3.47E-05	–	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	32598-14-4	PCB-105	5.54E-03	J	4.02E-02	J	mg/kg	South	NA	100	1.65E-06 - 8.50E-06	4.02E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	74472-37-0	PCB-114	2.92E-04	J	2.52E-03	–	mg/kg	South	NA	100	1.46E-06 - 7.50E-06	2.52E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	31508-00-6	PCB-118	1.72E-02	J	1.27E-01	J	mg/kg	Central	NA	100	2.91E-06 - 1.50E-05	1.27E-01	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	65510-44-3	PCB-123	2.94E-04	J	2.28E-03	J	mg/kg	Central	NA	100	1.65E-06 - 8.50E-06	2.28E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	57465-28-8	PCB-126	1.56E-06	U	5.19E-04	–	mg/kg	South	NA	24	1.56E-06 - 8.00E-06	5.19E-04	–	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	–	PCB-156/157	1.54E-03	J	1.09E-02	J	mg/kg	Central	NA	100	2.23E-06 - 1.15E-05	1.09E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	52663-72-6	PCB-167	7.11E-04	J	4.73E-03	J	mg/kg	Central	NA	100	1.26E-06 - 6.50E-06	4.73E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	32774-16-6	PCB-169	1.46E-06	U	7.94E-06	J	mg/kg	Central	NA	11	1.46E-06 - 7.50E-06	7.94E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	39635-31-9	PCB-189	1.05E-04	J	8.05E-04	J	mg/kg	Central	NA	100	1.26E-06 - 6.50E-06	8.05E-04	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	–	KM TEQ PCB	9.53E-07	J	5.51E-05	–	mg/kg	South	NA	100	-	5.51E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																				
	Fish	Fillet	American Eel	–	Total Non-DL PCBs	1.67E-01	J	9.69E-01	J	mg/kg	Central	NA	100	-	9.69E-01	J	2.08E-03	ca	–	Y	Max > screening val
	PAHs																				
	Fish	Fillet	American Eel	90-12-0	1-Methylnaphthalene	2.70E-03	U	2.90E-02	–	mg/kg	North	NA	22	2.70E-03 - 1.30E-02	2.90E-02	–	1.43E-01	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	91-57-6	2-Methylnaphthalene	2.70E-03	U	5.40E-02	–	mg/kg	North	NA	17	2.70E-03 - 1.30E-02	5.40E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	83-32-9	Acenaphthene	4.20E-03	J	2.80E-02	–	mg/kg	North	NA	72	2.70E-03 - 1.30E-02	2.80E-02	–	5.21E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	208-96-8	Acenaphthylene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	5.21E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	120-12-7	Anthracene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	56-55-3	Benz(a)anthracene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	50-32-8	Benzo(a)pyrene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	205-99-2	Benzo(b)fluoranthene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	192-97-2	Benzo(e)pyrene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	191-24-2	Benzo(g,h,i)perylene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	Benzo(j,k)Fluoranthene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	3.47E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	–	C1-Chrysenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C1-Fluoranthenes/Pyrenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C1-Fluorenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	6	2.70E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C1-Naphthalenes	2.70E-03	U	5.50E-02	–	mg/kg	North	NA	22	2.70E-03 - 1.30E-02	5.50E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C1-Phenanthrenes/Anthracenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	6	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C2-Chrysenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C2-Fluoranthenes/Pyrenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C2-Fluorenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C2-Naphthalenes	2.70E-03	U	7.70E-02	–	mg/kg	North	NA	17	2.70E-03 - 1.30E-02	7.70E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C2-Phenanthrenes/Anthracenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	6	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C3-Chrysenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C3-Fluoranthenes/Pyrenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C3-Fluorenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C3-Naphthalenes	2.70E-03	U	5.60E-02	–	mg/kg	North	NA	17	2.70E-03 - 1.30E-02	5.60E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C3-Phenanthrenes/Anthracenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	–	C4-Chrysenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	American Eel	–	C4-Naphthalenes	2.70E-03	U	2.50E-02	–	mg/kg	North	NA	6	2.70E-03 - 1.30E-02	2.50E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	–	C4-Phenanthrenes/anthracenes	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	218-01-9	Chrysene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	53-70-3	Dibenz(a,h)anthracene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	206-44-0	Fluoranthene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	28	2.70E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	86-73-7	Fluorene	2.70E-03	U, J	1.30E-02	U	mg/kg	Central, North	NA	17	2.70E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	193-39-5	Indeno(1,2,3-c,d)-pyrene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	91-20-3	Naphthalene	2.70E-03	U	3.10E-02	–	mg/kg	North	NA	39	2.70E-03 - 1.30E-02	3.10E-02	–	1.74E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	198-55-0	Perylene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	0	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	85-01-8	Phenanthrene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	17	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	129-00-0	Pyrene	2.70E-03	U	1.30E-02	U	mg/kg	Central, North	NA	6	2.70E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Max ≤ screening val
	Pesticides & Organics																				
	Fish	Fillet	American Eel	122-66-7	1,2-Diphenylhydrazine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	95-94-3	1,2,4,5-Tetrachlorobenzene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	91-58-7	2-Chloronaphthalene	1.30E-01	U	1.30E-01	U	mg/kg	Central, North, South	NA	0	1.30E-01 - 1.30E-01	1.30E-01	U	6.95E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	95-57-8	2-Chlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	88-74-4	2-Nitroaniline	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	88-75-5	2-Nitrophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	58-90-2	2,3,4,6-Tetrachlorophenol	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	120-83-2	2,4-Dichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	105-67-9	2,4-Dimethylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	51-28-5	2,4-Dinitrophenol	5.80E+00	U	6.00E+00	U	mg/kg	Central, North, South	NA	0	5.80E+00 - 6.00E+00	6.00E+00	U	1.74E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	121-14-2	2,4-Dinitrotoluene	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.34E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	95-95-4	2,4,5-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	88-06-2	2,4,6-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	53-19-0	2,4'-DDD	4.38E-04	J	7.89E-03	J	mg/kg	South	NA	100	4.98E-06 - 4.98E-06	7.89E-03	J	2.61E-03	nc	–	Y	Max > screening val
	Fish	Fillet	American Eel	3424-82-6	2,4'-DDE	2.36E-04	J	2.72E-03	–	mg/kg	South	NA	100	9.95E-06 - 9.95E-06	2.72E-03	–	1.22E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	789-02-6	2,4'-DDT	5.88E-05	J	6.68E-04	–	mg/kg	South	NA	100	1.08E-05 - 1.08E-05	6.68E-04	–	1.22E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	606-20-2	2,6-Dinitrotoluene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.77E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	99-09-2	3-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	91-94-1	3,3'-Dichlorobenzidine	1.90E+00	U	2.00E+00	U	mg/kg	Central, North, South	NA	0	1.90E+00 - 2.00E+00	2.00E+00	U	9.24E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	101-55-3	4-Bromophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	–	–	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	American Eel	59-50-7	4-Chloro-3-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	106-47-8	4-Chloroaniline	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	2.08E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	7005-72-3	4-Chlorophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	–	–	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	American Eel	106-44-5	4-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	100-01-6	4-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.08E-01	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	100-02-7	4-Nitrophenol	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	72-54-8	4,4'-DDD	1.63E-02	J	2.90E-01	J	mg/kg	South	NA	100	7.35E-06 - 7.35E-06	2.90E-01	J	2.61E-03	nc	–	Y	Max > screening val
	Fish	Fillet	American Eel	72-55-9	4,4'-DDE	3.84E-02	J	6.79E-01	J	mg/kg	South	NA	100	7.58E-06 - 7.58E-06	6.79E-01	J	1.22E-02	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	50-29-3	4,4'-DDT	1.10E-03	J	1.68E-02	–	mg/kg	South	NA	100	9.40E-06 - 9.40E-06	1.68E-02	–	1.22E-02	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	534-52-1	4,6-Dinitro-2-methylphenol	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	6.95E-03	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	98-86-2	Acetophenone	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	309-00-2	Aldrin	6.43E-06	J	1.21E-04	J	mg/kg	North	NA	100	9.16E-06 - 9.16E-06	1.21E-04	J	2.45E-04	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	319-84-6	Alpha-BHC	2.81E-05	J	2.70E-04	J	mg/kg	Central	NA	100	6.40E-06 - 6.40E-06	2.70E-04	J	6.60E-04	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	1912-24-9	Atrazine	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.81E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	100-52-7	Benzaldehyde	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.04E+00	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	92-87-5	Benzidine	1.40E+01	U	1.40E+01	U	mg/kg	Central, North, South	NA	0	1.40E+01 - 1.40E+01	1.40E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Fish	Fillet	American Eel	65-85-0	Benzoic Acid	3.20E+00	U	5.80E+00	J	mg/kg	South	NA	6	3.20E+00 - 3.30E+00	5.80E+00	J	3.48E+02	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	319-85-7	Beta-BHC	1.36E-05	J	1.53E-04	J	mg/kg	North	NA	100	1.11E-05 - 1.11E-05	1.53E-04	J	2.31E-03	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	92-52-4	Biphenyl	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-01	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	108-60-1	Bis(2-chloro-1-methylethyl) ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	111-91-1	bis(2-Chloroethoxy)methane	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	111-44-4	bis(2-Chloroethyl)ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.78E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.97E-01	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	85-68-7	Butyl benzyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.19E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	105-60-2	Caprolactam	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	4.35E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	86-74-8	Carbazole	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	5103-71-9	Chlordane, alpha (cis)	1.99E-03	–	2.08E-02	–	mg/kg	South	NA	100	8.83E-06 - 8.83E-06	2.08E-02	–	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	5103-74-2	Chlordane, gamma (trans)	4.00E-04	–	7.10E-03	J	mg/kg	Central	NA	100	1.37E-05 - 1.37E-05	7.10E-03	J	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	319-86-8	Delta-BHC	4.96E-06	J	9.08E-06	J	mg/kg	North	NA	39	5.08E-06 - 5.08E-06	9.08E-06	J	6.60E-04	ca	–	N	Max ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	American Eel	84-74-2	Di-n-butyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	117-84-0	Di-n-octyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	132-64-9	Dibenzofuran	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	1002-53-5	Dibutyltin	1.20E-03	U	1.30E-03	U	mg/kg	Central, North, South	NA	0	1.20E-03 - 1.30E-03	1.30E-03	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	60-57-1	Dieldrin	1.29E-03	J	2.17E-02	–	mg/kg	South	NA	100	1.54E-05 - 1.54E-05	2.17E-02	–	2.60E-04	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	84-66-2	Diethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	131-11-3	Dimethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	959-98-8	Endosulfan I	5.74E-05	U	5.74E-05	U	mg/kg	Central, North, South	NA	0	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	Central, North, South	NA	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	1031-07-8	Endosulfan Sulfate	6.33E-05	U	6.33E-05	U	mg/kg	Central, North, South	NA	0	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	72-20-8	Endrin	1.39E-05	U	7.00E-05	J	mg/kg	North	NA	56	1.39E-05 - 1.39E-05	7.00E-05	J	2.61E-02	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.31E-04	U	mg/kg	Central, North, South	NA	0	1.31E-04 - 1.31E-04	1.31E-04	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	53494-70-5	Endrin Ketone	5.42E-05	J	7.60E-05	U	mg/kg	Central, North, South	NA	6	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	58-89-9	Gamma-BHC (Lindane)	7.69E-06	U	7.04E-05	–	mg/kg	South	NA	94	7.69E-06 - 7.69E-06	7.04E-05	–	3.78E-03	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	76-44-8	Heptachlor	5.74E-06	J	3.25E-05	U	mg/kg	Central, North, South	NA	11	3.25E-05 - 3.25E-05	3.25E-05	U	9.24E-04	ca	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	1024-57-3	Heptachlor epoxide, cis-	4.74E-04	–	6.34E-03	J	mg/kg	North	NA	100	7.00E-06 - 7.00E-06	6.34E-03	J	4.57E-04	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	28044-83-9	Heptachlor epoxide, trans-	1.70E-05	U	1.45E-03	J	mg/kg	Central	NA	11	1.70E-05 - 1.70E-05	1.45E-03	J	4.57E-04	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	118-74-1	Hexachlorobenzene	7.71E-04	J	6.59E-03	J	mg/kg	South	NA	100	4.06E-06 - 4.06E-06	6.59E-03	J	2.60E-03	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	87-68-3	Hexachlorobutadiene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.33E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	77-47-4	Hexachlorocyclopentadiene	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	5.21E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	67-72-1	Hexachloroethane	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	6.08E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	78-59-1	Isophorone	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.38E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	72-43-5	Methoxychlor	2.99E-05	J	3.89E-05	U	mg/kg	Central, North, South	NA	6	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	2385-85-5	Mirex	1.44E-04	J	5.74E-04	J	mg/kg	North	NA	100	9.33E-06 - 9.33E-06	5.74E-04	J	2.31E-04	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	2406-65-7	Monobutyltin	1.90E-02	U	2.10E-02	U	mg/kg	Central, North	NA	0	1.90E-02 - 2.10E-02	2.10E-02	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	621-64-7	N-Nitroso-di-n-propylamine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.94E-04	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	86-30-6	N-Nitrosodiphenylamine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.49E-01	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	98-95-3	Nitrobenzene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	5103-73-1	Nonachlor, cis-	2.71E-03	–	1.76E-02	J	mg/kg	North	NA	100	1.26E-05 - 1.26E-05	1.76E-02	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	39765-80-5	Nonachlor, trans-	5.98E-03	–	5.31E-02	J	mg/kg	North	NA	100	1.04E-05 - 1.04E-05	5.31E-02	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	95-48-7	o-Cresol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	27304-13-8	Oxychlordane	2.60E-03	J	2.87E-02	J	mg/kg	North	NA	100	1.00E-05 - 1.00E-05	2.87E-02	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	American Eel	87-86-5	Pentachlorophenol	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.04E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	108-95-2	Phenol	3.20E-01	U	1.20E+00	J	mg/kg	South	NA	6	3.20E-01 - 3.30E-01	1.20E+00	J	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	110-86-1	Pyridine	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	1461-25-2	Tetrabutyltin	1.60E-03	U	1.70E-03	U	mg/kg	Central, North, South	NA	0	1.60E-03 - 1.70E-03	1.70E-03	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	688-73-3	Tributyltin	1.40E-03	U	2.10E-03	–	mg/kg	North	NA	7	1.40E-03 - 1.50E-03	2.10E-03	–	2.61E-02	nc	–	N	Max ≤ screening val
	Inorganics																				
	Fish	Fillet	American Eel	7429-90-5	Aluminum	3.86E+00	U	6.27E+00	J	mg/kg	North	NA	6	3.81E+00 - 5.54E+00	6.27E+00	J	8.69E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7440-36-0	Antimony	4.49E-02	U	6.53E-02	U	mg/kg	Central, North, South	NA	0	4.49E-02 - 6.53E-02	6.53E-02	U	3.48E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	American Eel	7440-38-2	Arsenic, organic	5.38E-01	–	1.76E+00	–	mg/kg	South	NA	100	9.18E-02 - 1.34E-01	1.76E+00	–	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	7440-38-2	Arsenic, inorganic	5.98E-02	–	1.96E-01	–	mg/kg	South	NA	100	1.02E-02 - 1.49E-02	1.96E-01	–	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	7440-39-3	Barium	1.25E-01	U	1.82E-01	U	mg/kg	Central, North, South	NA	0	1.25E-01 - 1.82E-01	1.82E-01	U	1.74E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	7440-41-7	Beryllium	9.70E-03	U	1.41E-02	U	mg/kg	Central, North, South	NA	0	9.70E-03 - 1.41E-02	1.41E-02	U	1.74E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	7440-43-9	Cadmium	3.13E-02	U	4.55E-02	U	mg/kg	Central, North, South	NA	0	3.13E-02 - 4.55E-02	4.55E-02	U	8.69E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	7440-70-2	Calcium	1.39E+02	–	3.77E+02	–	mg/kg	North	NA	100	1.27E+01 - 1.84E+01	3.77E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	American Eel	7440-47-3	Chromium [as Cr(III)]	6.80E-02	U	2.42E+00	–	mg/kg	North	NA	6	6.80E-02 - 9.90E-02	2.42E+00	–	8.32E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	American Eel	7440-48-4	Cobalt	1.38E-02	J	2.86E-02	J	mg/kg	North	NA	17	1.36E-02 - 1.98E-02	2.86E-02	J	2.61E-02	nc	–	Y	Max > screening val
	Fish	Fillet	American Eel	7440-50-8	Copper	5.52E-02	U	3.23E-01	J	mg/kg	Central	NA	61	5.44E-02 - 7.92E-02	3.23E-01	J	3.48E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7439-89-6	Iron	3.23E+00	U	2.14E+01	–	mg/kg	North	NA	33	3.14E+00 - 4.57E+00	2.14E+01	–	6.08E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7439-92-1	Lead	1.77E-02	U	3.39E-02	J	mg/kg	Central	NA	28	1.77E-02 - 2.57E-02	3.39E-02	J	1.50E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7439-95-4	Magnesium	1.69E+02	–	3.71E+02	–	mg/kg	Central	NA	100	2.30E+00 - 3.35E+00	3.71E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	American Eel	7439-96-5	Manganese	1.14E-01	U	6.99E-01	–	mg/kg	North	NA	44	1.14E-01 - 1.66E-01	6.99E-01	–	1.22E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7439-97-6	Mercury	1.72E-01	–	6.38E-01	–	mg/kg	North	NA	100	3.89E-04 - 2.42E-03	6.38E-01	–	2.61E-02	nc	–	Y	Max > screening val
	Fish	Fillet	American Eel	22967-92-6	Methyl Mercury	1.70E-01	–	7.64E-01	–	mg/kg	North	NA	100	1.70E-03 - 9.60E-03	7.64E-01	–	8.69E-03	nc	–	Y	Max > screening val
	Fish	Fillet	American Eel	7440-02-0	Nickel	1.28E-01	U	2.03E-01	J	mg/kg	North	NA	6	1.28E-01 - 1.86E-01	2.03E-01	J	1.74E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7440-09-7	Potassium	2.79E+03	–	5.75E+03	–	mg/kg	Central	NA	100	8.33E+00 - 1.21E+01	5.75E+03	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	American Eel	7782-49-2	Selenium	3.38E-01	J	8.48E-01	–	mg/kg	South	NA	100	6.80E-02 - 9.90E-02	8.48E-01	–	4.35E-01	nc	–	Y	Max > screening val
	Fish	Fillet	American Eel	7440-22-4	Silver	1.36E-02	U	1.98E-02	U	mg/kg	Central, North, South	NA	0	1.36E-02 - 1.98E-02	1.98E-02	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	American Eel	7440-23-5	Sodium	3.87E+02	–	7.48E+02	–	mg/kg	Central	NA	100	7.62E+00 - 1.11E+01	7.48E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	American Eel	7440-28-0	Thallium	2.04E-02	U	2.97E-02	U	mg/kg	Central, North, South	NA	0	2.04E-02 - 2.97E-02	2.97E-02	U	8.69E-04	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	American Eel	7440-32-6	Titanium	1.62E-01	U	3.66E-01	U	mg/kg	South	NA	0	1.62E-01 - 3.66E-01	3.66E-01	U	No screening level	–	–	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	American Eel	7440-62-2	Vanadium	2.04E-02	U	3.17E-02	J	mg/kg	South	NA	11	2.04E-02 - 2.97E-02	3.17E-02	J	4.38E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	American Eel	7440-66-6	Zinc	1.53E+01	–	4.31E+01	–	mg/kg	Central	NA	100	3.70E-01 - 7.33E-01	4.31E+01	–	2.61E+01	nc	–	Y	Max > screening val
	Dioxin-like Compounds																				
	Fish	Fillet	Bluefish	1746-01-6	2,3,7,8-TCDD	7.65E-08	J	3.19E-06	–	mg/kg	North	NA	100	1.86E-08 - 1.20E-07	3.19E-06	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	40321-76-4	1,2,3,7,8-PeCDD	6.12E-08	U	5.75E-07	J	mg/kg	North	NA	67	6.12E-08 - 1.39E-07	5.75E-07	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	39227-28-6	1,2,3,4,7,8-HxCDD	2.08E-08	U	1.68E-07	J	mg/kg	Central	NA	72	2.06E-08 - 4.27E-08	1.68E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	57653-85-7	1,2,3,6,7,8-HxCDD	3.52E-08	J	3.92E-07	J	mg/kg	Central	NA	100	2.13E-08 - 4.68E-08	3.92E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	19408-74-3	1,2,3,7,8,9-HxCDD	2.50E-08	U	1.53E-07	J	mg/kg	Central	NA	67	2.05E-08 - 4.60E-08	1.53E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	35822-46-9	1,2,3,4,6,7,8-HpCDD	5.77E-08	J	2.84E-07	J	mg/kg	Central	NA	100	1.85E-08 - 4.42E-08	2.84E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	3268-87-9	OCDD	1.04E-07	J	4.28E-07	J	mg/kg	North	NA	100	1.72E-08 - 4.40E-08	4.28E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	51207-31-9	2,3,7,8-TCDF	6.53E-08	J	9.03E-07	J	mg/kg	Central	NA	78	4.91E-08 - 1.40E-07	9.03E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	57117-41-6	1,2,3,7,8-PeCDF	1.46E-07	J	1.72E-06	J	mg/kg	Central	NA	100	2.37E-08 - 5.99E-08	1.72E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	57117-31-4	2,3,4,7,8-PeCDF	1.25E-07	J	1.18E-06	J	mg/kg	Central	NA	100	2.05E-08 - 5.09E-08	1.18E-06	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	70648-26-9	1,2,3,4,7,8-HxCDF	3.06E-08	J	2.08E-07	J	mg/kg	Central	NA	78	1.74E-08 - 5.05E-08	2.08E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	57117-44-9	1,2,3,6,7,8-HxCDF	4.10E-08	J	5.00E-07	J	mg/kg	Central	NA	100	1.72E-08 - 4.98E-08	5.00E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	72918-21-9	1,2,3,7,8,9-HxCDF	4.23E-08	U	1.00E-07	J	mg/kg	North	NA	89	1.72E-08 - 5.61E-08	1.00E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	60851-34-5	2,3,4,6,7,8-HxCDF	2.41E-08	J	1.25E-07	J	mg/kg	Central	NA	61	1.65E-08 - 4.57E-08	1.25E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	67562-39-4	1,2,3,4,6,7,8-HpCDF	1.04E-07	J	1.13E-06	J	mg/kg	North	NA	100	3.19E-08 - 8.71E-08	1.13E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	55673-89-7	1,2,3,4,7,8,9-HpCDF	4.44E-08	U	1.21E-07	J	mg/kg	Central	NA	39	4.44E-08 - 1.01E-07	1.21E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	39001-02-0	OCDF	3.40E-08	U	2.49E-07	J	mg/kg	North	NA	89	1.54E-08 - 8.63E-08	2.49E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	–	KM TEQ DF	3.08E-07	J	3.48E-06	–	mg/kg	North	NA	100	-	3.48E-06	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	32598-13-3	PCB-77	1.41E-05	–	2.64E-04	–	mg/kg	North	NA	100	1.34E-06 - 1.40E-06	2.64E-04	–	3.20E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	70362-50-4	PCB-81	1.72E-06	U	7.30E-06	–	mg/kg	Central	NA	46	1.72E-06 - 1.79E-06	7.30E-06	–	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	32598-14-4	PCB-105	3.66E-04	–	2.24E-03	J	mg/kg	North	NA	100	1.63E-06 - 1.70E-06	2.24E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	74472-37-0	PCB-114	2.31E-05	–	1.44E-04	–	mg/kg	North	NA	100	1.44E-06 - 1.50E-06	1.44E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	31508-00-6	PCB-118	1.43E-03	J	9.38E-03	J	mg/kg	North	NA	100	2.87E-06 - 3.00E-06	9.38E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	65510-44-3	PCB-123	1.97E-05	–	1.48E-04	–	mg/kg	North	NA	100	1.63E-06 - 1.70E-06	1.48E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	57465-28-8	PCB-126	1.54E-06	U	8.03E-05	–	mg/kg	Central	NA	56	1.53E-06 - 1.60E-06	8.03E-05	–	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	–	PCB-156/157	1.66E-04	–	1.01E-03	–	mg/kg	South	NA	100	2.20E-06 - 2.30E-06	1.01E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	52663-72-6	PCB-167	8.58E-05	–	4.61E-04	–	mg/kg	South	NA	100	1.24E-06 - 1.30E-06	4.61E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	32774-16-6	PCB-169	1.44E-06	U	2.50E-06	J	mg/kg	Central	NA	22	1.44E-06 - 1.50E-06	2.50E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	39635-31-9	PCB-189	1.89E-05	–	8.38E-05	–	mg/kg	South	NA	100	1.24E-06 - 1.30E-06	8.38E-05	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	–	KM TEQ PCB	2.45E-07	J	8.30E-06	–	mg/kg	Central	NA	100	-	8.30E-06	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																				
	Fish	Fillet	Bluefish	–	Total Non-DL PCBs	4.02E-02	J	2.45E-01	J	mg/kg	North	NA	100	-	2.45E-01	J	2.08E-03	ca	–	Y	Max > screening val
	PAHs																				
	Fish	Fillet	Bluefish	90-12-0	1-Methylnaphthalene	5.20E-03	U	2.20E-02	–	mg/kg	Central	NA	17	5.20E-03 - 5.30E-03	2.20E-02	–	1.43E-01	ca	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	91-57-6	2-Methylnaphthalene	5.20E-03	U	4.20E-02	–	mg/kg	Central	NA	17	5.20E-03 - 5.30E-03	4.20E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	83-32-9	Acenaphthene	5.20E-03	U	1.20E-02	J	mg/kg	Central	NA	11	5.20E-03 - 5.30E-03	1.20E-02	J	5.21E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	208-96-8	Acenaphthylene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	5.21E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	120-12-7	Anthracene	5.20E-03	U	5.50E-03	J	mg/kg	Central	NA	6	5.20E-03 - 5.30E-03	5.50E-03	J	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	56-55-3	Benz(a)anthracene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	50-32-8	Benzo(a)pyrene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	205-99-2	Benzo(b)fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	192-97-2	Benzo(e)pyrene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	191-24-2	Benzo(g,h,i)perylene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	Benzo(j,k)Fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.47E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	–	C1-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C1-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C1-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C1-Naphthalenes	5.20E-03	U	4.20E-02	–	mg/kg	Central	NA	22	5.20E-03 - 5.30E-03	4.20E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	–	C1-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C2-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C2-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C2-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C2-Naphthalenes	5.20E-03	U	1.60E-02	–	mg/kg	Central	NA	6	5.20E-03 - 5.30E-03	1.60E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	–	C2-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C3-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C3-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	–	C3-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Bluefish	--	C3-Naphthalenes	5.20E-03	U	7.50E-03	J	mg/kg	Central	NA	6	5.20E-03 - 5.30E-03	7.50E-03	J	3.48E-01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	--	C3-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	--	C4-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	--	C4-Naphthalenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	--	C4-Phenanthrenes/anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	218-01-9	Chrysene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	53-70-3	Dibenz(a,h)anthracene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	206-44-0	Fluoranthene	5.20E-03	U	9.30E-03	J	mg/kg	Central	NA	11	5.20E-03 - 5.30E-03	9.30E-03	J	3.48E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	86-73-7	Fluorene	5.20E-03	U	1.10E-02	J	mg/kg	Central	NA	6	5.20E-03 - 5.30E-03	1.10E-02	J	3.48E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	193-39-5	Indeno(1,2,3-c,d)-pyrene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	91-20-3	Naphthalene	5.20E-03	U	1.80E-01	--	mg/kg	Central	NA	28	5.20E-03 - 5.30E-03	1.80E-01	--	1.74E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	198-55-0	Perylene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	85-01-8	Phenanthrene	5.20E-03	U	2.00E-02	--	mg/kg	Central	NA	6	5.20E-03 - 5.30E-03	2.00E-02	--	2.61E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	129-00-0	Pyrene	5.20E-03	U	1.70E-02	--	mg/kg	Central	NA	11	5.20E-03 - 5.30E-03	1.70E-02	--	2.61E+00	nc	--	N	Max ≤ screening val
	Pesticides & Organics																				
	Fish	Fillet	Bluefish	122-66-7	1,2-Diphenylhydrazine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	95-94-3	1,2,4,5-Tetrachlorobenzene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	91-58-7	2-Chloronaphthalene	1.30E-01	U	1.30E-01	U	mg/kg	Central, North, South	NA	0	1.30E-01 - 1.30E-01	1.30E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	95-57-8	2-Chlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	88-74-4	2-Nitroaniline	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	88-75-5	2-Nitrophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	58-90-2	2,3,4,6-Tetrachlorophenol	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	120-83-2	2,4-Dichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	105-67-9	2,4-Dimethylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	51-28-5	2,4-Dinitrophenol	5.80E+00	U	6.00E+00	U	mg/kg	Central, North, South	NA	0	5.80E+00 - 6.00E+00	6.00E+00	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	121-14-2	2,4-Dinitrotoluene	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	95-95-4	2,4,5-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	88-06-2	2,4,6-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	53-19-0	2,4'-DDD	5.74E-05	J	1.19E-03	J	mg/kg	Central	NA	100	4.98E-06 - 4.98E-06	1.19E-03	J	2.61E-03	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	3424-82-6	2,4'-DDE	1.50E-04	J	3.05E-03	J	mg/kg	South	NA	100	9.95E-06 - 9.95E-06	3.05E-03	J	1.22E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	789-02-6	2,4'-DDT	1.08E-05	U	6.37E-04	J	mg/kg	South	NA	89	1.08E-05 - 1.08E-05	6.37E-04	J	1.22E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	606-20-2	2,6-Dinitrotoluene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	99-09-2	3-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	91-94-1	3,3'-Dichlorobenzidine	1.90E+00	U	2.00E+00	U	mg/kg	Central, North, South	NA	0	1.90E+00 - 2.00E+00	2.00E+00	U	9.24E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	101-55-3	4-Bromophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Bluefish	59-50-7	4-Chloro-3-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	106-47-8	4-Chloroaniline	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	7005-72-3	4-Chlorophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Bluefish	106-44-5	4-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	100-01-6	4-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	100-02-7	4-Nitrophenol	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	72-54-8	4,4'-DDD	6.07E-04	--	2.24E-02	J	mg/kg	South	NA	100	7.35E-06 - 7.35E-06	2.24E-02	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	Bluefish	72-55-9	4,4'-DDE	3.70E-03	J	6.95E-02	J	mg/kg	South	NA	100	7.58E-06 - 7.58E-06	6.95E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Bluefish	50-29-3	4,4'-DDT	9.44E-05	--	6.88E-02	J	mg/kg	South	NA	100	9.40E-06 - 9.40E-06	6.88E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Bluefish	534-52-1	4,6-Dinitro-2-methylphenol	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	98-86-2	Acetophenone	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	309-00-2	Aldrin	5.30E-06	J	5.50E-05	J	mg/kg	North	NA	44	9.16E-06 - 9.16E-06	5.50E-05	J	2.45E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	319-84-6	Alpha-BHC	6.40E-06	U	6.41E-05	--	mg/kg	North	NA	94	6.40E-06 - 6.40E-06	6.41E-05	--	6.60E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	1912-24-9	Atrazine	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	100-52-7	Benzaldehyde	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.04E+00	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	92-87-5	Benzidine	1.40E+01	U	1.40E+01	U	mg/kg	Central, North, South	NA	0	1.40E+01 - 1.40E+01	1.40E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Fish	Fillet	Bluefish	65-85-0	Benzoic Acid	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	3.48E+02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	319-85-7	Beta-BHC	8.97E-06	J	5.72E-05	J	mg/kg	North	NA	100	1.11E-05 - 1.11E-05	5.72E-05	J	2.31E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	92-52-4	Biphenyl	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-01	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	108-60-1	Bis(2-chloro-1-methylethyl) ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	111-91-1	bis(2-Chloroethoxy)methane	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	111-44-4	bis(2-Chloroethyl)ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.78E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.97E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	85-68-7	Butyl benzyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.19E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	105-60-2	Caprolactam	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	4.35E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	86-74-8	Carbazole	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Bluefish	5103-71-9	Chlordane, alpha (cis)	3.69E-04	--	1.43E-02	J	mg/kg	North	NA	100	8.83E-06 - 8.83E-06	1.43E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Bluefish	5103-74-2	Chlordane, gamma (trans)	1.86E-04	--	5.26E-03	J	mg/kg	North	NA	100	1.37E-05 - 1.37E-05	5.26E-03	J	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	319-86-8	Delta-BHC	4.78E-06	J	5.08E-06	U	mg/kg	Central, North, South	NA	6	5.08E-06 - 5.08E-06	5.08E-06	U	6.60E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	84-74-2	Di-n-butyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	117-84-0	Di-n-octyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	132-64-9	Dibenzofuran	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	1002-53-5	Dibutyltin	1.20E-03	U	1.30E-03	U	mg/kg	Central, North, South	NA	0	1.20E-03 - 1.30E-03	1.30E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	60-57-1	Dieldrin	3.93E-04	--	1.17E-02	J	mg/kg	North	NA	100	1.54E-05 - 1.54E-05	1.17E-02	J	2.60E-04	ca	--	Y	Max > screening val
	Fish	Fillet	Bluefish	84-66-2	Diethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	131-11-3	Dimethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	959-98-8	Endosulfan I	5.74E-05	U	5.74E-05	U	mg/kg	Central, North, South	NA	0	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	Central, North, South	NA	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	1031-07-8	Endosulfan Sulfate	3.31E-05	J	8.41E-05	J	mg/kg	North	NA	17	6.33E-05 - 6.33E-05	8.41E-05	J	5.21E-01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	72-20-8	Endrin	8.27E-06	J	2.33E-05	J	mg/kg	Central	NA	39	1.39E-05 - 1.39E-05	2.33E-05	J	2.61E-02	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.31E-04	U	mg/kg	Central, North, South	NA	0	1.31E-04 - 1.31E-04	1.31E-04	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	53494-70-5	Endrin Ketone	3.62E-05	J	7.60E-05	U	mg/kg	Central, North, South	NA	6	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	58-89-9	Gamma-BHC (Lindane)	7.41E-06	J	3.77E-05	J	mg/kg	North	NA	89	7.69E-06 - 7.69E-06	3.77E-05	J	3.78E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	76-44-8	Heptachlor	9.43E-06	J	3.25E-05	U	mg/kg	Central, North, South	NA	17	3.25E-05 - 3.25E-05	3.25E-05	U	9.24E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	1024-57-3	Heptachlor epoxide, cis-	8.98E-05	J	3.14E-03	J	mg/kg	North	NA	100	7.00E-06 - 7.00E-06	3.14E-03	J	4.57E-04	ca	--	Y	Max > screening val
	Fish	Fillet	Bluefish	28044-83-9	Heptachlor epoxide, trans-	1.70E-05	U	1.70E-05	U	mg/kg	Central, North, South	NA	0	1.70E-05 - 1.70E-05	1.70E-05	U	4.57E-04	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	118-74-1	Hexachlorobenzene	1.27E-04	J	1.12E-03	J	mg/kg	North	NA	100	4.06E-06 - 4.06E-06	1.12E-03	J	2.60E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	87-68-3	Hexachlorobutadiene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.33E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	77-47-4	Hexachlorocyclopentadiene	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	5.21E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	67-72-1	Hexachloroethane	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	6.08E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	78-59-1	Isophorone	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.38E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	72-43-5	Methoxychlor	3.89E-05	U	3.89E-05	U	mg/kg	Central, North, South	NA	0	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	2385-85-5	Mirex	9.33E-06	U	2.15E-04	J	mg/kg	South	NA	94	9.33E-06 - 9.33E-06	2.15E-04	J	2.31E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	2406-65-7	Monobutyltin	1.90E-02	U	2.10E-02	U	mg/kg	Central, North	NA	0	1.90E-02 - 2.10E-02	2.10E-02	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	621-64-7	N-Nitroso-di-n-propylamine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.94E-04	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	86-30-6	N-Nitrosodiphenylamine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.49E-01	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	98-95-3	Nitrobenzene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	5103-73-1	Nonachlor, cis-	1.92E-04	--	3.44E-03	J	mg/kg	North	NA	100	1.26E-05 - 1.26E-05	3.44E-03	J	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	39765-80-5	Nonachlor, trans-	4.45E-04	J	8.58E-03	J	mg/kg	North	NA	100	1.04E-05 - 1.04E-05	8.58E-03	J	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	95-48-7	o-Cresol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	27304-13-8	Oxychlordane	1.00E-05	U	7.89E-04	J	mg/kg	North	NA	94	1.00E-05 - 1.00E-05	7.89E-04	J	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	87-86-5	Pentachlorophenol	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.04E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	108-95-2	Phenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	110-86-1	Pyridine	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	1461-25-2	Tetrabutyltin	1.60E-03	U	1.70E-03	U	mg/kg	Central, North, South	NA	0	1.60E-03 - 1.70E-03	1.70E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	688-73-3	Tributyltin	1.40E-03	U	1.50E-03	U	mg/kg	Central, North, South	NA	0	1.40E-03 - 1.50E-03	1.50E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Inorganics																				
	Fish	Fillet	Bluefish	7429-90-5	Aluminum	3.86E+00	U	1.23E+01	J	mg/kg	Central	NA	33	3.73E+00 - 5.60E+00	1.23E+01	J	8.69E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7440-36-0	Antimony	4.40E-02	U	6.60E-02	U	mg/kg	Central	NA	0	4.40E-02 - 6.60E-02	6.60E-02	U	3.48E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	7440-38-2	Arsenic, organic	2.36E-01	J	1.14E+00	--	mg/kg	Central	NA	100	9.00E-02 - 1.35E-01	1.14E+00	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	7440-38-2	Arsenic, inorganic	2.62E-02	J	1.27E-01	--	mg/kg	Central	NA	100	1.00E-02 - 1.50E-02	1.27E-01	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	7440-39-3	Barium	1.25E-01	U	2.45E-01	J	mg/kg	Central	NA	6	1.23E-01 - 1.84E-01	2.45E-01	J	1.74E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7440-41-7	Beryllium	9.50E-03	U	1.42E-02	U	mg/kg	Central	NA	0	9.50E-03 - 1.42E-02	1.42E-02	U	1.74E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	7440-43-9	Cadmium	3.07E-02	U	4.60E-02	U	mg/kg	Central	NA	0	3.07E-02 - 4.60E-02	4.60E-02	U	8.69E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	7440-70-2	Calcium	1.09E+02	--	5.29E+02	--	mg/kg	South	NA	100	1.24E+01 - 1.86E+01	5.29E+02	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	Bluefish	7440-47-3	Chromium [as Cr(III)]	6.67E-02	U	1.67E-01	J	mg/kg	Central	NA	11	6.67E-02 - 1.00E-01	1.67E-01	J	8.32E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Bluefish	7440-48-4	Cobalt	1.33E-02	U	2.23E-01	--	mg/kg	Central	NA	6	1.33E-02 - 2.00E-02	2.23E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Fish	Fillet	Bluefish	7440-50-8	Copper	5.75E-01	--	1.06E+00	--	mg/kg	Central	NA	100	5.33E-02 - 8.00E-02	1.06E+00	--	3.48E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7439-89-6	Iron	4.62E+00	U	1.32E+01	J	mg/kg	Central	NA	94	3.08E+00 - 4.62E+00	1.32E+01	J	6.08E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7439-92-1	Lead	1.75E-02	J	1.52E-01	--	mg/kg	North	NA	17	1.73E-02 - 2.60E-02	1.52E-01	--	1.50E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7439-95-4	Magnesium	2.94E+02	--	3.67E+02	--	mg/kg	Central	NA	100	2.25E+00 - 3.38E+00	3.67E+02	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	Bluefish	7439-96-5	Manganese	1.12E-01	U	3.23E-01	--	mg/kg	North	NA	39	1.12E-01 - 1.68E-01	3.23E-01	--	1.22E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7439-97-6	Mercury	1.01E-01	--	3.96E-01	--	mg/kg	South	NA	100	4.89E-04 - 2.76E-03	3.96E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Fish	Fillet	Bluefish	22967-92-6	Methyl Mercury	1.22E-01	--	4.67E-01	--	mg/kg	Central	NA	100	1.70E-03 - 2.70E-03	4.67E-01	--	8.69E-03	nc	--	Y	Max > screening val
	Fish	Fillet	Bluefish	7440-02-0	Nickel	1.25E-01	U	1.88E-01	U	mg/kg	Central	NA	0	1.25E-01 - 1.88E-01	1.88E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	7440-09-7	Potassium	4.05E+03	--	5.20E+03	--	mg/kg	Central	NA	100	8.16E+00 - 1.22E+01	5.20E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	Bluefish	7782-49-2	Selenium	3.33E-01	J	6.78E-01	--	mg/kg	North	NA	100	6.67E-02 - 1.00E-01	6.78E-01	--	4.35E-01	nc	--	Y	Max > screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Bluefish	7440-22-4	Silver	1.33E-02	U	2.00E-02	U	mg/kg	Central	NA	0	1.33E-02 - 2.00E-02	2.00E-02	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Bluefish	7440-23-5	Sodium	3.38E+02	–	7.10E+02	–	mg/kg	Central	NA	100	7.47E+00 - 1.12E+01	7.10E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Bluefish	7440-28-0	Thallium	2.00E-02	U	3.00E-02	U	mg/kg	Central	NA	0	2.00E-02 - 3.00E-02	3.00E-02	U	8.69E-04	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Bluefish	7440-32-6	Titanium	1.63E-01	U	3.56E-01	U	mg/kg	Central	NA	0	1.63E-01 - 3.56E-01	3.56E-01	U	No screening level	–	–	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Bluefish	7440-62-2	Vanadium	2.04E-02	U	3.19E-02	J	mg/kg	Central	NA	11	2.00E-02 - 3.00E-02	3.19E-02	J	4.38E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Bluefish	7440-66-6	Zinc	1.31E+01	–	2.14E+01	–	mg/kg	Central	NA	100	4.93E-01 - 7.40E-01	2.14E+01	–	2.61E+01	nc	–	N	Max ≤ screening val
	Dioxin-like Compounds																				
	Fish	Fillet	Striped Bass	1746-01-6	2,3,7,8-TCDD	2.26E-07	J	2.77E-05	J	mg/kg	South	NA	100	2.77E-08 - 1.81E-07	2.77E-05	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	40321-76-4	1,2,3,7,8-PeCDD	7.64E-08	U	1.15E-06	J	mg/kg	South	NA	57	7.64E-08 - 3.69E-07	1.15E-06	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	39227-28-6	1,2,3,4,7,8-HxCDD	2.59E-08	U	4.48E-07	J	mg/kg	South	NA	90	2.39E-08 - 1.08E-07	4.48E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	57653-85-7	1,2,3,6,7,8-HxCDD	3.36E-08	J	4.78E-07	J	mg/kg	South	NA	100	2.55E-08 - 1.15E-07	4.78E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	19408-74-3	1,2,3,7,8,9-HxCDD	2.45E-08	U	2.03E-07	J	mg/kg	South	NA	67	2.38E-08 - 1.08E-07	2.03E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	35822-46-9	1,2,3,4,6,7,8-HpCDD	3.94E-08	J	4.54E-06	J	mg/kg	South	NA	100	1.98E-08 - 8.34E-08	4.54E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	3268-87-9	OCDD	1.04E-07	J	5.34E-05	J	mg/kg	South	NA	100	2.07E-08 - 6.09E-08	5.34E-05	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	51207-31-9	2,3,7,8-TCDF	2.66E-07	J	8.51E-06	J	mg/kg	South	NA	100	6.71E-08 - 2.96E-07	8.51E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	57117-41-6	1,2,3,7,8-PeCDF	3.18E-07	J	4.65E-06	J	mg/kg	South	NA	100	3.27E-08 - 1.76E-07	4.65E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	57117-31-4	2,3,4,7,8-PeCDF	3.09E-07	J	8.12E-06	J	mg/kg	South	NA	100	2.86E-08 - 1.59E-07	8.12E-06	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	70648-26-9	1,2,3,4,7,8-HxCDF	2.55E-08	J	1.16E-06	J	mg/kg	South	NA	81	2.27E-08 - 1.16E-07	1.16E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	57117-44-9	1,2,3,6,7,8-HxCDF	4.21E-08	J	3.50E-06	J	mg/kg	South	NA	100	2.21E-08 - 1.18E-07	3.50E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	72918-21-9	1,2,3,7,8,9-HxCDF	3.58E-08	J	2.38E-07	J	mg/kg	South	NA	100	2.32E-08 - 1.31E-07	2.38E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	60851-34-5	2,3,4,6,7,8-HxCDF	2.55E-08	J	2.70E-07	J	mg/kg	South	NA	62	2.13E-08 - 1.17E-07	2.70E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	67562-39-4	1,2,3,4,6,7,8-HpCDF	1.92E-07	J	1.06E-05	J	mg/kg	South	NA	100	3.43E-08 - 1.63E-07	1.06E-05	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	55673-89-7	1,2,3,4,7,8,9-HpCDF	4.00E-08	U	2.15E-07	U	mg/kg	South	NA	57	4.00E-08 - 2.15E-07	2.15E-07	U	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	39001-02-0	OCDF	4.99E-08	J	4.87E-07	J	mg/kg	South	NA	95	2.14E-08 - 1.14E-07	4.87E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	–	KM TEQ DF	6.50E-07	J	3.30E-05	J	mg/kg	South	NA	100	-	3.30E-05	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	32598-13-3	PCB-77	7.98E-05	–	3.90E-03	J	mg/kg	South	NA	100	1.34E-06 - 1.31E-05	3.90E-03	J	3.20E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	70362-50-4	PCB-81	1.73E-06	U	1.15E-04	J	mg/kg	South	NA	47	1.73E-06 - 8.89E-06	1.15E-04	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	32598-14-4	PCB-105	1.30E-03	J	1.46E-02	J	mg/kg	South	NA	100	1.63E-06 - 8.40E-06	1.46E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	74472-37-0	PCB-114	6.26E-05	–	2.37E-03	J	mg/kg	South	NA	100	1.44E-06 - 1.40E-05	2.37E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	31508-00-6	PCB-118	6.98E-03	J	9.99E-02	J	mg/kg	South	NA	100	2.88E-06 - 2.80E-05	9.99E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	65510-44-3	PCB-123	1.63E-06	U	1.72E-03	J	mg/kg	South	NA	86	1.63E-06 - 1.59E-05	1.72E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	57465-28-8	PCB-126	1.54E-06	U	3.67E-04	–	mg/kg	South	NA	68	1.54E-06 - 1.50E-05	3.67E-04	–	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	–	PCB-156/157	6.42E-04	–	8.89E-03	J	mg/kg	South	NA	100	2.21E-06 - 2.15E-05	8.89E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	52663-72-6	PCB-167	3.21E-04	–	3.49E-03	J	mg/kg	South	NA	100	1.25E-06 - 1.21E-05	3.49E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	32774-16-6	PCB-169	1.45E-06	U	1.40E-05	U	mg/kg	South	NA	24	1.44E-06 - 1.40E-05	1.40E-05	U	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	39635-31-9	PCB-189	5.57E-05	–	6.95E-04	J	mg/kg	South	NA	100	1.25E-06 - 1.21E-05	6.95E-04	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	–	KM TEQ PCB	4.14E-07	J	3.93E-05	–	mg/kg	South	NA	100	-	3.93E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																				
	Fish	Fillet	Striped Bass	–	Total Non-DL PCBs	8.36E-02	J	2.06E+00	J	mg/kg	South	NA	100	-	2.06E+00	J	2.08E-03	ca	–	Y	Max > screening val
	PAHs																				
	Fish	Fillet	Striped Bass	90-12-0	1-Methylnaphthalene	5.20E-03	U	1.10E-02	J	mg/kg	South	NA	10	5.20E-03 - 5.30E-03	1.10E-02	J	1.43E-01	ca	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	91-57-6	2-Methylnaphthalene	5.20E-03	U	1.80E-02	–	mg/kg	South	NA	10	5.20E-03 - 5.30E-03	1.80E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	83-32-9	Acenaphthene	5.20E-03	U	6.00E-03	J	mg/kg	South	NA	5	5.20E-03 - 5.30E-03	6.00E-03	J	5.21E+00	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	208-96-8	Acenaphthylene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	5.21E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	120-12-7	Anthracene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	56-55-3	Benz(a)anthracene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	50-32-8	Benzo(a)pyrene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	205-99-2	Benzo(b)fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	192-97-2	Benzo(e)pyrene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	191-24-2	Benzo(g,h,i)perylene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	Benzo(j,k)Fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.47E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	–	C1-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C1-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C1-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C1-Naphthalenes	5.20E-03	U	1.60E-02	–	mg/kg	South	NA	14	5.20E-03 - 5.30E-03	1.60E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	–	C1-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C2-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C2-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C2-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	–	C2-Naphthalenes	5.20E-03	U	1.10E-02	J	mg/kg	South	NA	19	5.20E-03 - 5.30E-03	1.10E-02	J	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	–	C2-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Striped Bass	--	C3-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	--	C3-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	--	C3-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	--	C3-Naphthalenes	5.20E-03	U	7.60E-03	J	mg/kg	South	NA	5	5.20E-03 - 5.30E-03	7.60E-03	J	3.48E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	--	C3-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	--	C4-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	--	C4-Naphthalenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	--	C4-Phenanthrenes/anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	218-01-9	Chrysene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	53-70-3	Dibenz(a,h)anthracene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	206-44-0	Fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	86-73-7	Fluorene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	193-39-5	Indeno(1,2,3-c,d)-pyrene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	91-20-3	Naphthalene	5.20E-03	U	8.00E-03	J	mg/kg	South	NA	10	5.20E-03 - 5.30E-03	8.00E-03	J	1.74E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	198-55-0	Perylene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	85-01-8	Phenanthrene	5.20E-03	U	5.50E-03	J	mg/kg	South	NA	5	5.20E-03 - 5.30E-03	5.50E-03	J	2.61E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	129-00-0	Pyrene	5.20E-03	U	5.30E-03	U	mg/kg	South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Pesticides & Organics																				
	Fish	Fillet	Striped Bass	122-66-7	1,2-Diphenylhydrazine	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	95-94-3	1,2,4,5-Tetrachlorobenzene	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	91-58-7	2-Chloronaphthalene	1.30E-01	U	1.30E-01	U	mg/kg	South	NA	0	1.30E-01 - 1.30E-01	1.30E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	95-57-8	2-Chlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	88-74-4	2-Nitroaniline	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	88-75-5	2-Nitrophenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	58-90-2	2,3,4,6-Tetrachlorophenol	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	120-83-2	2,4-Dichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	105-67-9	2,4-Dimethylphenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	51-28-5	2,4-Dinitrophenol	5.80E+00	U	6.00E+00	U	mg/kg	South	NA	0	5.80E+00 - 6.00E+00	6.00E+00	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	121-14-2	2,4-Dinitrotoluene	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	95-95-4	2,4,5-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	88-06-2	2,4,6-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	53-19-0	2,4'-DDD	2.86E-04	J	1.03E-01	J	mg/kg	South	NA	100	4.98E-06 - 4.98E-06	1.03E-01	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	Striped Bass	3424-82-6	2,4'-DDE	1.30E-04	J	3.97E-02	J	mg/kg	South	NA	100	9.95E-06 - 9.95E-06	3.97E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Striped Bass	789-02-6	2,4'-DDT	3.67E-05	J	8.38E-03	J	mg/kg	South	NA	100	1.08E-05 - 1.08E-05	8.38E-03	J	1.22E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	606-20-2	2,6-Dinitrotoluene	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	99-09-2	3-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	91-94-1	3,3'-Dichlorobenzidine	1.90E+00	U	2.00E+00	U	mg/kg	South	NA	0	1.90E+00 - 2.00E+00	2.00E+00	U	9.24E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	101-55-3	4-Bromophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Striped Bass	59-50-7	4-Chloro-3-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	106-47-8	4-Chloroaniline	6.50E-01	U	6.70E-01	U	mg/kg	South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	7005-72-3	4-Chlorophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Striped Bass	106-44-5	4-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	100-01-6	4-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	100-02-7	4-Nitrophenol	3.20E+00	U	3.30E+00	U	mg/kg	South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	72-54-8	4,4'-DDD	2.36E-03	J	4.18E-01	J	mg/kg	South	NA	100	7.35E-06 - 7.35E-06	4.18E-01	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	Striped Bass	72-55-9	4,4'-DDE	8.87E-03	J	4.23E-01	J	mg/kg	South	NA	100	7.58E-06 - 7.58E-06	4.23E-01	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Striped Bass	50-29-3	4,4'-DDT	2.93E-04	J	4.10E-02	J	mg/kg	South	NA	100	9.40E-06 - 9.40E-06	4.10E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Striped Bass	534-52-1	4,6-Dinitro-2-methylphenol	3.20E+00	U	3.30E+00	U	mg/kg	South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	98-86-2	Acetophenone	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	309-00-2	Aldrin	2.32E-06	J	2.40E-04	J	mg/kg	South	NA	67	9.16E-06 - 9.16E-06	2.40E-04	J	2.45E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	319-84-6	Alpha-BHC	8.89E-06	J	1.03E-04	--	mg/kg	South	NA	100	6.40E-06 - 6.40E-06	1.03E-04	--	6.60E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	1912-24-9	Atrazine	6.50E-01	U	6.70E-01	U	mg/kg	South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	100-52-7	Benzaldehyde	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.04E+00	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	92-87-5	Benzidine	1.40E+01	U	1.40E+01	U	mg/kg	South	NA	0	1.40E+01 - 1.40E+01	1.40E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Fish	Fillet	Striped Bass	65-85-0	Benzoic Acid	3.20E+00	U	3.30E+00	U	mg/kg	South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	3.48E+02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	319-85-7	Beta-BHC	5.91E-06	J	6.16E-05	--	mg/kg	South	NA	95	1.11E-05 - 1.11E-05	6.16E-05	--	2.31E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	92-52-4	Biphenyl	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-01	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	108-60-1	Bis(2-chloro-1-methylethyl) ether	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	111-91-1	bis(2-Chloroethoxy)methane	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	111-44-4	bis(2-Chloroethyl)ether	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.78E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.97E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Striped Bass	85-68-7	Butyl benzyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.19E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	105-60-2	Caprolactam	6.50E-01	U	6.70E-01	U	mg/kg	South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	4.35E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	86-74-8	Carbazole	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	5103-71-9	Chlordane, alpha (cis)	8.30E-04	–	1.32E-01	J	mg/kg	South	NA	100	8.83E-06 - 8.83E-06	1.32E-01	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	5103-74-2	Chlordane, gamma (trans)	1.72E-04	J	2.25E-02	J	mg/kg	South	NA	100	1.37E-05 - 1.37E-05	2.25E-02	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	319-86-8	Delta-BHC	2.69E-06	J	5.18E-06	J	mg/kg	South	NA	29	5.08E-06 - 5.08E-06	5.18E-06	J	6.60E-04	ca	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	84-74-2	Di-n-butyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	117-84-0	Di-n-octyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	132-64-9	Dibenzofuran	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	1002-53-5	Dibutyltin	1.20E-03	U	3.00E-03	J	mg/kg	South	NA	5	1.20E-03 - 1.30E-03	3.00E-03	J	2.61E-02	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	60-57-1	Dieldrin	5.01E-04	–	3.60E-02	J	mg/kg	South	NA	100	1.54E-05 - 1.54E-05	3.60E-02	J	2.60E-04	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	84-66-2	Diethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	131-11-3	Dimethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	959-98-8	Endosulfan I	5.74E-05	U	5.74E-05	U	mg/kg	South	NA	0	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	South	NA	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	1031-07-8	Endosulfan Sulfate	5.24E-05	J	6.33E-05	U	mg/kg	South	NA	5	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	72-20-8	Endrin	1.26E-05	J	6.75E-05	J	mg/kg	South	NA	62	1.39E-05 - 1.39E-05	6.75E-05	J	2.61E-02	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.31E-04	U	mg/kg	South	NA	0	1.31E-04 - 1.31E-04	1.31E-04	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	53494-70-5	Endrin Ketone	4.46E-05	J	7.60E-05	U	mg/kg	South	NA	6	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	58-89-9	Gamma-BHC (Lindane)	7.69E-06	U	6.53E-05	–	mg/kg	South	NA	95	7.69E-06 - 7.69E-06	6.53E-05	–	3.78E-03	ca	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	76-44-8	Heptachlor	4.87E-06	J	4.26E-05	J	mg/kg	South	NA	38	3.25E-05 - 3.25E-05	4.26E-05	J	9.24E-04	ca	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	1024-57-3	Heptachlor epoxide, cis-	1.32E-04	–	5.26E-03	J	mg/kg	South	NA	100	7.00E-06 - 7.00E-06	5.26E-03	J	4.57E-04	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	28044-83-9	Heptachlor epoxide, trans-	1.70E-05	U	1.70E-05	U	mg/kg	South	NA	0	1.70E-05 - 1.70E-05	1.70E-05	U	4.57E-04	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	118-74-1	Hexachlorobenzene	1.78E-04	J	2.63E-03	J	mg/kg	South	NA	100	4.06E-06 - 4.06E-06	2.63E-03	J	2.60E-03	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	87-68-3	Hexachlorobutadiene	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.33E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	77-47-4	Hexachlorocyclopentadiene	3.20E+00	U	3.30E+00	U	mg/kg	South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	5.21E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	67-72-1	Hexachloroethane	6.50E-01	U	6.70E-01	U	mg/kg	South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	6.08E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	78-59-1	Isophorone	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.38E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	72-43-5	Methoxychlor	3.89E-05	U	3.89E-05	U	mg/kg	South	NA	0	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	2385-85-5	Mirex	4.78E-05	–	5.10E-04	–	mg/kg	South	NA	100	9.33E-06 - 9.33E-06	5.10E-04	–	2.31E-04	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	2406-65-7	Monobutyltin	1.90E-02	U	2.10E-02	U	mg/kg	South	NA	0	1.90E-02 - 2.10E-02	2.10E-02	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	621-64-7	N-Nitroso-di-n-propylamine	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.94E-04	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	86-30-6	N-Nitrosodiphenylamine	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.49E-01	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	98-95-3	Nitrobenzene	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	5103-73-1	Nonachlor, cis-	7.35E-04	–	3.63E-02	J	mg/kg	South	NA	100	1.26E-05 - 1.26E-05	3.63E-02	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	39765-80-5	Nonachlor, trans-	1.63E-03	–	8.70E-02	J	mg/kg	South	NA	100	1.04E-05 - 1.04E-05	8.70E-02	J	1.19E-02	ca	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	95-48-7	o-Cresol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	27304-13-8	Oxychlordane	1.44E-04	–	1.03E-02	J	mg/kg	South	NA	100	1.00E-05 - 1.00E-05	1.03E-02	J	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	87-86-5	Pentachlorophenol	6.50E-01	U	6.70E-01	U	mg/kg	South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.04E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	108-95-2	Phenol	3.20E-01	U	3.30E-01	U	mg/kg	South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	110-86-1	Pyridine	1.30E+00	U	1.30E+00	U	mg/kg	South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	1461-25-2	Tetrabutyltin	1.50E-03	U	1.10E-02	J	mg/kg	South	NA	5	1.50E-03 - 1.70E-03	1.10E-02	J	2.61E-02	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	688-73-3	Tributyltin	1.40E-03	U	6.40E-03	J	mg/kg	South	NA	5	1.40E-03 - 1.50E-03	6.40E-03	J	2.61E-02	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Inorganics																				
	Fish	Fillet	Striped Bass	7429-90-5	Aluminum	3.84E+00	U	5.60E+00	U	mg/kg	South	NA	0	3.84E+00 - 5.60E+00	5.60E+00	U	8.69E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	7440-36-0	Antimony	4.52E-02	U	7.55E-02	J	mg/kg	South	NA	5	4.52E-02 - 6.60E-02	7.55E-02	J	3.48E-02	nc	–	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	7440-38-2	Arsenic, organic	3.42E-01	–	1.44E+00	–	mg/kg	South	NA	100	9.27E-02 - 1.35E-01	1.44E+00	–	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	7440-38-2	Arsenic, inorganic	3.80E-02	–	1.60E-01	–	mg/kg	South	NA	100	1.03E-02 - 1.50E-02	1.60E-01	–	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	7440-39-3	Barium	1.26E-01	U	3.67E-01	–	mg/kg	South	NA	5	1.26E-01 - 1.84E-01	3.67E-01	–	1.74E+01	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	7440-41-7	Beryllium	9.70E-03	U	1.42E-02	U	mg/kg	South	NA	0	9.70E-03 - 1.42E-02	1.42E-02	U	1.74E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	7440-43-9	Cadmium	3.15E-02	U	4.60E-02	U	mg/kg	South	NA	0	3.15E-02 - 4.60E-02	4.60E-02	U	8.69E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	7440-70-2	Calcium	6.10E+01	–	2.80E+03	J	mg/kg	South	NA	100	1.27E+01 - 1.86E+01	2.80E+03	J	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Striped Bass	7440-47-3	Chromium [as Cr(III)]	6.85E-02	U	2.28E-01	J	mg/kg	South	NA	24	6.85E-02 - 1.00E-01	2.28E-01	J	8.32E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Striped Bass	7440-48-4	Cobalt	1.37E-02	U	2.00E-02	U	mg/kg	South	NA	0	1.37E-02 - 2.00E-02	2.00E-02	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	7440-50-8	Copper	3.05E-01	J	7.82E-01	J	mg/kg	South	NA	100	5.48E-02 - 8.00E-02	7.82E-01	J	3.48E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	7439-89-6	Iron	3.53E+00	U	9.82E+00	J	mg/kg	South	NA	76	3.16E+00 - 4.62E+00	9.82E+00	J	6.08E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	7439-92-1	Lead	1.78E-02	U	3.58E-02	J	mg/kg	South	NA	5	1.78E-02 - 2.60E-02	3.58E-02	J	1.50E+00	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	7439-95-4	Magnesium	2.14E+02	–	3.36E+02	–	mg/kg	South	NA	100	2.32E+00 - 3.38E+00	3.36E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Striped Bass	7439-96-5	Manganese	1.15E-01	U	6.36E-01	J	mg/kg	South	NA	24	1.15E-01 - 1.68E-01	6.36E-01	J	1.22E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Striped Bass	7439-97-6	Mercury	1.04E-01	–	4.85E-01	–	mg/kg	South	NA	100	3.81E-04 - 2.41E-03	4.85E-01	–	2.61E-02	nc	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	22967-92-6	Methyl Mercury	1.29E-01	–	5.76E-01	–	mg/kg	South	NA	100	1.60E-03 - 2.80E-03	5.76E-01	–	8.69E-03	nc	–	Y	Max > screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Striped Bass	7440-02-0	Nickel	1.29E-01	U	1.88E-01	U	mg/kg	South	NA	0	1.29E-01 - 1.88E-01	1.88E-01	U	1.74E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	7440-09-7	Potassium	3.14E+03	–	4.94E+03	–	mg/kg	South	NA	100	8.38E+00 - 1.22E+01	4.94E+03	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Striped Bass	7782-49-2	Selenium	2.47E-01	J	4.44E-01	–	mg/kg	South	NA	100	6.85E-02 - 1.00E-01	4.44E-01	–	4.35E-01	nc	–	Y	Max > screening val
	Fish	Fillet	Striped Bass	7440-22-4	Silver	1.37E-02	U	2.00E-02	U	mg/kg	South	NA	0	1.37E-02 - 2.00E-02	2.00E-02	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Striped Bass	7440-23-5	Sodium	4.33E+02	–	7.52E+02	–	mg/kg	South	NA	100	7.67E+00 - 1.12E+01	7.52E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Striped Bass	7440-28-0	Thallium	2.05E-02	U	3.00E-02	U	mg/kg	South	NA	0	2.05E-02 - 3.00E-02	3.00E-02	U	8.69E-04	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Striped Bass	7440-32-6	Titanium	1.62E-01	U	3.66E-01	U	mg/kg	South	NA	10	1.62E-01 - 3.66E-01	3.66E-01	U	No screening level	–	–	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Striped Bass	7440-62-2	Vanadium	2.10E-02	U	3.00E-02	U	mg/kg	South	NA	5	2.05E-02 - 3.00E-02	3.00E-02	U	4.38E-01	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	Striped Bass	7440-66-6	Zinc	4.76E+00	J	1.07E+01	–	mg/kg	South	NA	100	5.07E-01 - 7.40E-01	1.07E+01	–	2.61E+01	nc	–	N	Max ≤ screening val
	Dioxin-like Compounds																				
	Fish	Fillet	Summer Flounder	1746-01-6	2,3,7,8-TCDD	1.23E-07	U	1.04E-05	–	mg/kg	North	NA	94	1.44E-08 - 1.23E-07	1.04E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	40321-76-4	1,2,3,7,8-PeCDD	5.71E-08	U	4.72E-07	J	mg/kg	South	NA	44	5.71E-08 - 1.64E-07	4.72E-07	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	39227-28-6	1,2,3,4,7,8-HxCDD	1.60E-08	J	1.64E-07	J	mg/kg	Central	NA	89	1.56E-08 - 5.07E-08	1.64E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	57653-85-7	1,2,3,6,7,8-HxCDD	7.09E-08	J	4.35E-07	J	mg/kg	South	NA	100	1.67E-08 - 5.48E-08	4.35E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	19408-74-3	1,2,3,7,8,9-HxCDD	2.23E-08	U	1.78E-07	J	mg/kg	South	NA	89	1.60E-08 - 5.56E-08	1.78E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	35822-46-9	1,2,3,4,6,7,8-HpCDD	8.14E-08	J	5.97E-07	J	mg/kg	South	NA	100	1.23E-08 - 4.24E-08	5.97E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	3268-87-9	OCDD	1.19E-07	J	6.33E-07	J	mg/kg	North	NA	100	1.56E-08 - 5.61E-08	6.33E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	51207-31-9	2,3,7,8-TCDF	6.20E-08	J	5.91E-07	J	mg/kg	South	NA	89	3.23E-08 - 1.41E-07	5.91E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	57117-41-6	1,2,3,7,8-PeCDF	2.54E-08	U	8.01E-07	J	mg/kg	South	NA	94	1.83E-08 - 6.81E-08	8.01E-07	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	57117-31-4	2,3,4,7,8-PeCDF	2.73E-07	J	1.55E-06	J	mg/kg	South	NA	100	1.59E-08 - 5.99E-08	1.55E-06	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	70648-26-9	1,2,3,4,7,8-HxCDF	9.74E-08	J	1.00E-06	J	mg/kg	North	NA	100	1.61E-08 - 5.55E-08	1.00E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	57117-44-9	1,2,3,6,7,8-HxCDF	8.13E-08	J	4.25E-07	J	mg/kg	South	NA	100	1.55E-08 - 5.41E-08	4.25E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	72918-21-9	1,2,3,7,8,9-HxCDF	3.48E-08	J	2.71E-07	J	mg/kg	Central	NA	100	1.54E-08 - 5.67E-08	2.71E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	60851-34-5	2,3,4,6,7,8-HxCDF	2.29E-08	J	1.86E-07	J	mg/kg	South	NA	94	1.48E-08 - 5.25E-08	1.86E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	67562-39-4	1,2,3,4,6,7,8-HpCDF	1.01E-07	J	8.20E-07	J	mg/kg	North	NA	100	1.78E-08 - 4.65E-08	8.20E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	55673-89-7	1,2,3,4,7,8,9-HpCDF	2.41E-08	J	2.16E-07	J	mg/kg	Central	NA	94	2.36E-08 - 5.92E-08	2.16E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	39001-02-0	OCDF	4.15E-08	J	3.24E-07	J	mg/kg	Central	NA	100	1.52E-08 - 9.41E-08	3.24E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	–	KM TEQ DF	5.20E-07	J	1.10E-05	–	mg/kg	North	NA	100		1.10E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	32598-13-3	PCB-77	1.68E-05	–	2.44E-04	–	mg/kg	Central	NA	100	1.34E-06 - 1.39E-06	2.44E-04	–	3.20E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	70362-50-4	PCB-81	1.72E-06	U	3.72E-05	–	mg/kg	Central	NA	76	1.72E-06 - 1.79E-06	3.72E-05	–	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	32598-14-4	PCB-105	3.75E-04	–	7.34E-03	J	mg/kg	Central	NA	100	1.62E-06 - 1.69E-06	7.34E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	74472-37-0	PCB-114	3.56E-05	–	6.15E-04	J	mg/kg	Central	NA	100	1.43E-06 - 1.49E-06	6.15E-04	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	31508-00-6	PCB-118	1.65E-03	J	2.93E-02	J	mg/kg	Central	NA	100	2.86E-06 - 2.99E-06	2.93E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	65510-44-3	PCB-123	1.68E-06	U	5.19E-04	–	mg/kg	Central	NA	94	1.62E-06 - 1.69E-06	5.19E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	57465-28-8	PCB-126	1.56E-06	U	1.12E-04	–	mg/kg	South	NA	79	1.53E-06 - 1.59E-06	1.12E-04	–	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	–	PCB-156/157	1.75E-04	–	3.14E-03	J	mg/kg	Central	NA	100	2.19E-06 - 2.29E-06	3.14E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	52663-72-6	PCB-167	7.24E-05	–	1.27E-03	J	mg/kg	Central	NA	100	1.24E-06 - 1.29E-06	1.27E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	32774-16-6	PCB-169	1.43E-06	U	2.03E-06	J	mg/kg	South	NA	6	1.43E-06 - 1.49E-06	2.03E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	39635-31-9	PCB-189	1.01E-05	–	2.38E-04	–	mg/kg	Central	NA	100	1.24E-06 - 1.29E-06	2.38E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	–	KM TEQ PCB	9.07E-08	J	1.20E-05	–	mg/kg	South	NA	100	-	1.20E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																				
	Fish	Fillet	Summer Flounder	–	Total Non-DL PCBs	2.11E-02	J	4.52E-01	J	mg/kg	Central	NA	100	-	4.52E-01	J	2.08E-03	ca	–	Y	Max > screening val
	PAHs																				
	Fish	Fillet	Summer Flounder	90-12-0	1-Methylnaphthalene	5.20E-03	U	2.00E-02	–	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	2.00E-02	–	1.43E-01	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	91-57-6	2-Methylnaphthalene	5.20E-03	U	2.70E-02	–	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	2.70E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	83-32-9	Acenaphthene	5.20E-03	U	1.90E-02	–	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	1.90E-02	–	5.21E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	208-96-8	Acenaphthylene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	5.21E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	120-12-7	Anthracene	5.20E-03	U	6.60E-03	J	mg/kg	South	NA	6	5.20E-03 - 5.30E-03	6.60E-03	J	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	56-55-3	Benz(a)anthracene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	50-32-8	Benzo(a)pyrene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	205-99-2	Benzo(b)fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	192-97-2	Benzo(e)pyrene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	191-24-2	Benzo(g,h,i)perylene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	–	Benzo(j,k)Fluoranthene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.47E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	–	C1-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	–	C1-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	–	C1-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	–	C1-Naphthalenes	5.20E-03	U	3.20E-02	–	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	3.20E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	–	C1-Phenanthrenes/Anthracenes	5.20E-03	U	6.30E-03	J	mg/kg	South	NA	6	5.20E-03 - 5.30E-03	6.30E-03	J	2.61E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	–	C2-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	–	C2-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Summer Flounder	--	C2-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C2-Naphthalenes	5.20E-03	U	1.30E-02	J	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	1.30E-02	J	3.48E-01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	--	C2-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C3-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C3-Fluoranthenes/Pyrenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C3-Fluorenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C3-Naphthalenes	5.20E-03	U	5.80E-03	J	mg/kg	South	NA	6	5.20E-03 - 5.30E-03	5.80E-03	J	3.48E-01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	--	C3-Phenanthrenes/Anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C4-Chrysenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C4-Naphthalenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	3.48E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	--	C4-Phenanthrenes/anthracenes	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	218-01-9	Chrysene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	53-70-3	Dibenz(a,h)anthracene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	206-44-0	Fluoranthene	5.20E-03	U	9.80E-03	J	mg/kg	South	NA	6	5.20E-03 - 5.30E-03	9.80E-03	J	3.48E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	86-73-7	Fluorene	5.20E-03	U	1.50E-02	--	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	1.50E-02	--	3.48E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	193-39-5	Indeno(1,2,3-c,d)-pyrene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	4.16E-02	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	91-20-3	Naphthalene	5.20E-03	U	9.80E-02	--	mg/kg	Central	NA	17	5.20E-03 - 5.30E-03	9.80E-02	--	1.74E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	198-55-0	Perylene	5.20E-03	U	5.30E-03	U	mg/kg	Central, North, South	NA	0	5.20E-03 - 5.30E-03	5.30E-03	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	85-01-8	Phenanthrene	5.20E-03	U	3.20E-02	--	mg/kg	South	NA	11	5.20E-03 - 5.30E-03	3.20E-02	--	2.61E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	129-00-0	Pyrene	5.20E-03	U	5.70E-03	J	mg/kg	South	NA	6	5.20E-03 - 5.30E-03	5.70E-03	J	2.61E+00	nc	--	N	Max ≤ screening val
	Pesticides & Organics																				
	Fish	Fillet	Summer Flounder	122-66-7	1,2-Diphenylhydrazine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	95-94-3	1,2,4,5-Tetrachlorobenzene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	91-58-7	2-Chloronaphthalene	1.30E-01	U	1.30E-01	U	mg/kg	Central, North, South	NA	0	1.30E-01 - 1.30E-01	1.30E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	95-57-8	2-Chlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	88-74-4	2-Nitroaniline	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	88-75-5	2-Nitrophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	58-90-2	2,3,4,6-Tetrachlorophenol	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	120-83-2	2,4-Dichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	105-67-9	2,4-Dimethylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	51-28-5	2,4-Dinitrophenol	5.80E+00	U	6.00E+00	U	mg/kg	Central, North, South	NA	0	5.80E+00 - 6.00E+00	6.00E+00	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	121-14-2	2,4-Dinitrotoluene	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	95-95-4	2,4,5-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	88-06-2	2,4,6-Trichlorophenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	53-19-0	2,4'-DDD	1.17E-04	J	9.18E-03	J	mg/kg	South	NA	100	4.98E-06 - 4.98E-06	9.18E-03	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	Summer Flounder	3424-82-6	2,4'-DDE	1.69E-04	J	7.52E-03	J	mg/kg	South	NA	100	9.95E-06 - 9.95E-06	7.52E-03	J	1.22E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	789-02-6	2,4'-DDT	1.08E-05	U	6.13E-04	J	mg/kg	South	NA	78	1.08E-05 - 1.08E-05	6.13E-04	J	1.22E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	606-20-2	2,6-Dinitrotoluene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	99-09-2	3-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	91-94-1	3,3'-Dichlorobenzidine	1.90E+00	U	2.00E+00	U	mg/kg	Central, North, South	NA	0	1.90E+00 - 2.00E+00	2.00E+00	U	9.24E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	101-55-3	4-Bromophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	59-50-7	4-Chloro-3-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	106-47-8	4-Chloroaniline	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	7005-72-3	4-Chlorophenyl phenyl ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	106-44-5	4-Methylphenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	100-01-6	4-Nitroaniline	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	100-02-7	4-Nitrophenol	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	72-54-8	4,4'-DDD	4.54E-04	J	4.50E-02	J	mg/kg	South	NA	100	7.35E-06 - 7.35E-06	4.50E-02	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	Summer Flounder	72-55-9	4,4'-DDE	1.17E-03	J	6.31E-02	J	mg/kg	South	NA	100	7.58E-06 - 7.58E-06	6.31E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	Summer Flounder	50-29-3	4,4'-DDT	9.40E-06	U	2.54E-03	J	mg/kg	South	NA	94	9.40E-06 - 9.40E-06	2.54E-03	J	1.22E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	534-52-1	4,6-Dinitro-2-methylphenol	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	98-86-2	Acetophenone	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	309-00-2	Aldrin	4.20E-06	J	9.16E-06	U	mg/kg	Central, North, South	NA	50	9.16E-06 - 9.16E-06	9.16E-06	U	2.45E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	319-84-6	Alpha-BHC	5.47E-06	J	6.50E-05	--	mg/kg	North	NA	89	6.40E-06 - 6.40E-06	6.50E-05	--	6.60E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	1912-24-9	Atrazine	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	100-52-7	Benzaldehyde	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	1.04E+00	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	92-87-5	Benzidine	1.40E+01	U	1.40E+01	U	mg/kg	Central, North, South	NA	0	1.40E+01 - 1.40E+01	1.40E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Fish	Fillet	Summer Flounder	65-85-0	Benzoic Acid	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	3.48E+02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	319-85-7	Beta-BHC	5.42E-06	J	2.32E-05	J	mg/kg	Central	NA	67	1.11E-05 - 1.11E-05	2.32E-05	J	2.31E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	92-52-4	Biphenyl	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.20E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	108-60-1	Bis(2-chloro-1-methylethyl) ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Summer Flounder	111-91-1	bis(2-Chloroethoxy)methane	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	111-44-4	bis(2-Chloroethyl)ether	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.78E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	117-81-7	bis(2-Ethylhexyl)phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.97E-01	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	85-68-7	Butyl benzyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	2.19E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	105-60-2	Caprolactam	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	4.35E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	86-74-8	Carbazole	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	5103-71-9	Chlordane, alpha (cis)	2.34E-04	J	4.62E-03	J	mg/kg	South	NA	100	8.83E-06 - 8.83E-06	4.62E-03	J	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	5103-74-2	Chlordane, gamma (trans)	1.24E-04	J	1.21E-03	J	mg/kg	South	NA	100	1.37E-05 - 1.37E-05	1.21E-03	J	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	319-86-8	Delta-BHC	5.08E-06	U	5.08E-06	U	mg/kg	Central, North, South	NA	0	5.08E-06 - 5.08E-06	5.08E-06	U	6.60E-04	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	84-74-2	Di-n-butyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	117-84-0	Di-n-octyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	132-64-9	Dibenzofuran	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	1002-53-5	Dibutyltin	1.20E-03	U	1.30E-03	U	mg/kg	Central, North, South	NA	0	1.20E-03 - 1.30E-03	1.30E-03	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	60-57-1	Dieldrin	2.64E-04	J	2.53E-03	J	mg/kg	South	NA	100	1.54E-05 - 1.54E-05	2.53E-03	J	2.60E-04	ca	–	Y	Max > screening val
	Fish	Fillet	Summer Flounder	84-66-2	Diethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	131-11-3	Dimethyl phthalate	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	6.95E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	959-98-8	Endosulfan I	5.74E-05	U	5.74E-05	U	mg/kg	Central, North, South	NA	0	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	Central, North, South	NA	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	1031-07-8	Endosulfan Sulfate	2.62E-05	J	6.33E-05	U	mg/kg	Central, North, South	NA	6	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	72-20-8	Endrin	1.15E-05	J	1.39E-05	U	mg/kg	Central, North, South	NA	17	1.39E-05 - 1.39E-05	1.39E-05	U	2.61E-02	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.31E-04	U	mg/kg	Central, North, South	NA	0	1.31E-04 - 1.31E-04	1.31E-04	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	53494-70-5	Endrin Ketone	7.60E-05	U	7.60E-05	U	mg/kg	Central, North, South	NA	0	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	58-89-9	Gamma-BHC (Lindane)	3.29E-06	J	1.12E-05	J	mg/kg	South	NA	44	7.69E-06 - 7.69E-06	1.12E-05	J	3.78E-03	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	76-44-8	Heptachlor	3.25E-05	U	3.25E-05	U	mg/kg	Central, North, South	NA	0	3.25E-05 - 3.25E-05	3.25E-05	U	9.24E-04	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	1024-57-3	Heptachlor epoxide, cis-	5.85E-05	J	5.51E-04	–	mg/kg	North	NA	100	7.00E-06 - 7.00E-06	5.51E-04	–	4.57E-04	ca	–	Y	Max > screening val
	Fish	Fillet	Summer Flounder	28044-83-9	Heptachlor epoxide, trans-	1.70E-05	U	1.70E-05	U	mg/kg	Central, North, South	NA	0	1.70E-05 - 1.70E-05	1.70E-05	U	4.57E-04	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	118-74-1	Hexachlorobenzene	1.01E-04	J	8.12E-04	J	mg/kg	South	NA	100	4.06E-06 - 4.06E-06	8.12E-04	J	2.60E-03	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	87-68-3	Hexachlorobutadiene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.33E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	77-47-4	Hexachlorocyclopentadiene	3.20E+00	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	3.20E+00 - 3.30E+00	3.30E+00	U	5.21E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	67-72-1	Hexachloroethane	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	6.08E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	78-59-1	Isophorone	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.38E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	72-43-5	Methoxychlor	3.89E-05	U	3.89E-05	U	mg/kg	Central, North, South	NA	0	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	2385-85-5	Mirex	9.33E-06	U	9.74E-05	J	mg/kg	South	NA	87	9.33E-06 - 9.33E-06	9.74E-05	J	2.31E-04	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	2406-65-7	Monobutyltin	1.90E-02	U	2.10E-02	U	mg/kg	North	NA	0	1.90E-02 - 2.10E-02	2.10E-02	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	621-64-7	N-Nitroso-di-n-propylamine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	5.94E-04	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	86-30-6	N-Nitrosodiphenylamine	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	8.49E-01	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	98-95-3	Nitrobenzene	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	1.74E-01	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	5103-73-1	Nonachlor, cis-	9.15E-05	J	2.45E-03	J	mg/kg	South	NA	100	1.26E-05 - 1.26E-05	2.45E-03	J	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	39765-80-5	Nonachlor, trans-	2.03E-04	J	6.72E-03	J	mg/kg	South	NA	100	1.04E-05 - 1.04E-05	6.72E-03	J	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	95-48-7	o-Cresol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	4.35E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	27304-13-8	Oxychlordane	1.05E-04	J	2.70E-03	–	mg/kg	North	NA	100	1.00E-05 - 1.00E-05	2.70E-03	–	1.19E-02	ca	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	87-86-5	Pentachlorophenol	6.50E-01	U	6.70E-01	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 6.70E-01	6.70E-01	U	1.04E-02	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	108-95-2	Phenol	3.20E-01	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	3.20E-01 - 3.30E-01	3.30E-01	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	110-86-1	Pyridine	1.30E+00	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	1.30E+00 - 1.30E+00	1.30E+00	U	8.69E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	1461-25-2	Tetrabutyltin	1.60E-03	U	1.70E-03	U	mg/kg	Central, North, South	NA	0	1.60E-03 - 1.70E-03	1.70E-03	U	2.61E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	688-73-3	Tributyltin	1.40E-03	U	2.10E-03	J	mg/kg	South	NA	28	1.40E-03 - 1.50E-03	2.10E-03	J	2.61E-02	nc	–	N	Max ≤ screening val
	Inorganics																				
	Fish	Fillet	Summer Flounder	7429-90-5	Aluminum	4.06E+00	U	5.60E+00	U	mg/kg	Central, North, South	NA	0	4.06E+00 - 5.60E+00	5.60E+00	U	8.69E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7440-36-0	Antimony	4.78E-02	U	6.60E-02	U	mg/kg	Central, South	NA	0	4.78E-02 - 6.60E-02	6.60E-02	U	3.48E-02	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	7440-38-2	Arsenic, organic	5.37E-01	–	3.24E+00	–	mg/kg	South	NA	100	9.81E-02 - 1.35E-01	3.24E+00	–	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	7440-38-2	Arsenic, inorganic	5.97E-02	–	3.60E-01	–	mg/kg	South	NA	100	1.09E-02 - 1.50E-02	3.60E-01	–	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	7440-39-3	Barium	1.33E-01	U	1.84E-01	U	mg/kg	Central, South	NA	0	1.33E-01 - 1.84E-01	1.84E-01	U	1.74E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7440-41-7	Beryllium	1.03E-02	U	1.42E-02	U	mg/kg	Central, South	NA	0	1.03E-02 - 1.42E-02	1.42E-02	U	1.74E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7440-43-9	Cadmium	3.33E-02	U	4.60E-02	U	mg/kg	Central, South	NA	0	3.33E-02 - 4.60E-02	4.60E-02	U	8.69E-02	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7440-70-2	Calcium	2.07E+02	–	2.10E+03	–	mg/kg	Central	NA	100	1.35E+01 - 1.86E+01	2.10E+03	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Summer Flounder	7440-47-3	Chromium [as Cr(III)]	7.25E-02	U	1.23E+00	–	mg/kg	North	NA	22	7.25E-02 - 1.00E-01	1.23E+00	–	8.32E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	Summer Flounder	7440-48-4	Cobalt	1.45E-02	U	2.16E+00	–	mg/kg	North	NA	11	1.45E-02 - 2.00E-02	2.16E+00	–	2.61E-02	nc	–	Y	Max > screening val
	Fish	Fillet	Summer Flounder	7440-50-8	Copper	1.32E-01	J	3.91E-01	–	mg/kg	South	NA	100	5.80E-02 - 8.00E-02	3.91E-01	–	3.48E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	7439-89-6	Iron	3.35E+00	U	5.13E+00	J	mg/kg	North	NA	6	3.35E+00 - 4.62E+00	5.13E+00	J	6.08E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	7439-92-1	Lead	1.88E-02	U	2.60E-02	U	mg/kg	Central, South	NA	0	1.88E-02 - 2.60E-02	2.60E-02	U	1.50E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7439-95-4	Magnesium	3.33E+02	–	3.90E+02	–	mg/kg	South	NA	100	2.45E+00 - 3.38E+00	3.90E+02	–	Essential nutrient	–	–	N	Essential nutrient

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	Summer Flounder	7439-96-5	Manganese	1.62E-01	U	4.19E-01	–	mg/kg	South	NA	89	1.22E-01 - 1.68E-01	4.19E-01	–	1.22E+01	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	7439-97-6	Mercury	6.71E-02	–	3.48E-01	–	mg/kg	Central	NA	100	3.82E-04 - 2.47E-03	3.48E-01	–	2.61E-02	nc	–	Y	Max > screening val
	Fish	Fillet	Summer Flounder	22967-92-6	Methyl Mercury	6.59E-02	–	4.00E-01	–	mg/kg	Central	NA	100	1.70E-03 - 5.70E-03	4.00E-01	–	8.69E-03	nc	–	Y	Max > screening val
	Fish	Fillet	Summer Flounder	7440-02-0	Nickel	1.36E-01	U	4.59E-01	–	mg/kg	North	NA	6	1.36E-01 - 1.88E-01	4.59E-01	–	1.74E+00	nc	–	N	Max ≤ screening val
	Fish	Fillet	Summer Flounder	7440-09-7	Potassium	4.50E+03	–	5.16E+03	–	mg/kg	North	NA	100	8.87E+00 - 1.22E+01	5.16E+03	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Summer Flounder	7782-49-2	Selenium	4.31E-01	–	8.19E-01	–	mg/kg	North	NA	100	7.25E-02 - 1.00E-01	8.19E-01	–	4.35E-01	nc	–	Y	Max > screening val
	Fish	Fillet	Summer Flounder	7440-22-4	Silver	1.45E-02	U	2.00E-02	U	mg/kg	Central, South	NA	0	1.45E-02 - 2.00E-02	2.00E-02	U	4.35E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7440-23-5	Sodium	3.63E+02	–	5.29E+02	–	mg/kg	South	NA	100	8.12E+00 - 1.12E+01	5.29E+02	–	Essential nutrient	–	–	N	Essential nutrient
	Fish	Fillet	Summer Flounder	7440-28-0	Thallium	2.17E-02	U	3.00E-02	U	mg/kg	Central, South	NA	0	2.17E-02 - 3.00E-02	3.00E-02	U	8.69E-04	nc	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	7440-32-6	Titanium	1.63E-01	U	3.70E-01	U	mg/kg	South	NA	0	1.63E-01 - 3.70E-01	3.70E-01	U	No screening level	–	–	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	Summer Flounder	7440-62-2	Vanadium	2.17E-02	U	3.00E-02	U	mg/kg	Central, South	NA	0	2.17E-02 - 3.00E-02	3.00E-02	U	4.38E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	Summer Flounder	7440-66-6	Zinc	4.47E+00	–	7.93E+00	–	mg/kg	South	NA	100	5.36E-01 - 7.40E-01	7.93E+00	–	2.61E+01	nc	–	N	Max ≤ screening val
	Dioxin-like Compounds																				
	Fish	Fillet	White Perch	1746-01-6	2,3,7,8-TCDD	1.44E-06	J	3.18E-05	J	mg/kg	Central	NA	100	3.12E-08 - 9.41E-08	3.18E-05	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	40321-76-4	1,2,3,7,8-PeCDD	6.45E-08	U	7.36E-07	J	mg/kg	South	NA	35	6.45E-08 - 1.97E-07	7.36E-07	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	39227-28-6	1,2,3,4,7,8-HxCDD	6.94E-08	J	3.89E-07	J	mg/kg	South	NA	100	2.69E-08 - 6.68E-08	3.89E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	57653-85-7	1,2,3,6,7,8-HxCDD	2.21E-07	J	9.26E-07	J	mg/kg	South	NA	100	2.86E-08 - 6.97E-08	9.26E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	19408-74-3	1,2,3,7,8,9-HxCDD	4.66E-08	J	2.24E-07	J	mg/kg	Central	NA	85	2.91E-08 - 7.04E-08	2.24E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	35822-46-9	1,2,3,4,6,7,8-HpCDD	2.04E-07	J	5.55E-07	J	mg/kg	South	NA	100	2.03E-08 - 4.76E-08	5.55E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	3268-87-9	OCDD	4.55E-07	J	1.51E-06	J	mg/kg	South	NA	100	1.48E-08 - 3.39E-08	1.51E-06	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	51207-31-9	2,3,7,8-TCDF	1.28E-06	J	6.39E-06	J	mg/kg	South	NA	100	1.23E-07 - 2.45E-07	6.39E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	57117-41-6	1,2,3,7,8-PeCDF	1.55E-06	J	4.93E-06	J	mg/kg	South	NA	100	3.02E-08 - 1.15E-07	4.93E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	57117-31-4	2,3,4,7,8-PeCDF	1.61E-06	J	4.80E-06	J	mg/kg	North	NA	100	2.47E-08 - 1.00E-07	4.80E-06	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	70648-26-9	1,2,3,4,7,8-HxCDF	3.22E-07	J	3.76E-06	J	mg/kg	North	NA	100	2.01E-08 - 6.77E-08	3.76E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	57117-44-9	1,2,3,6,7,8-HxCDF	4.55E-07	J	1.66E-06	J	mg/kg	Central	NA	100	1.93E-08 - 6.53E-08	1.66E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	72918-21-9	1,2,3,7,8,9-HxCDF	5.37E-08	J	2.08E-07	J	mg/kg	Central	NA	95	1.99E-08 - 6.34E-08	2.08E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	60851-34-5	2,3,4,6,7,8-HxCDF	7.52E-08	J	3.30E-07	J	mg/kg	Central	NA	100	1.92E-08 - 6.31E-08	3.30E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	67562-39-4	1,2,3,4,6,7,8-HpCDF	5.68E-07	J	4.12E-06	J	mg/kg	Central	NA	100	4.46E-08 - 7.67E-08	4.12E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	55673-89-7	1,2,3,4,7,8,9-HpCDF	6.07E-08	J	1.81E-07	J	mg/kg	Central	NA	30	6.07E-08 - 8.74E-08	1.81E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	39001-02-0	OCDF	6.06E-08	J	4.08E-07	J	mg/kg	Central	NA	100	2.52E-08 - 4.45E-08	4.08E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	–	KM TEQ DF	2.60E-06	J	3.37E-05	J	mg/kg	Central	NA	100		3.37E-05	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	32598-13-3	PCB-77	4.69E-04	–	1.51E-03	–	mg/kg	North	NA	100	6.67E-06 - 6.97E-06	1.51E-03	–	3.20E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	70362-50-4	PCB-81	8.77E-06	U	6.02E-05	–	mg/kg	North	NA	90	8.57E-06 - 8.96E-06	6.02E-05	–	1.07E-04	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	32598-14-4	PCB-105	3.31E-03	J	9.93E-03	J	mg/kg	North	NA	100	8.10E-06 - 8.46E-06	9.93E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	74472-37-0	PCB-114	2.72E-04	J	7.72E-04	–	mg/kg	North	NA	100	7.14E-06 - 7.46E-06	7.72E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	31508-00-6	PCB-118	1.32E-02	J	3.75E-02	J	mg/kg	North	NA	100	1.43E-05 - 1.49E-05	3.75E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	65510-44-3	PCB-123	2.15E-04	J	7.50E-04	–	mg/kg	Central	NA	100	8.10E-06 - 8.46E-06	7.50E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	57465-28-8	PCB-126	2.84E-05	–	7.88E-05	–	mg/kg	North	NA	100	7.62E-06 - 7.96E-06	7.88E-05	–	3.20E-07	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	–	PCB-156/157	1.51E-03	–	3.71E-03	–	mg/kg	North	NA	100	1.10E-05 - 1.14E-05	3.71E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	52663-72-6	PCB-167	6.02E-04	–	1.53E-03	–	mg/kg	South	NA	100	6.19E-06 - 6.47E-06	1.53E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	32774-16-6	PCB-169	7.14E-06	U	7.46E-06	U	mg/kg	Central, North	NA	0	7.14E-06 - 7.46E-06	7.46E-06	U	1.07E-06	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	39635-31-9	PCB-189	1.26E-04	J	2.83E-04	–	mg/kg	Central	NA	100	6.19E-06 - 6.47E-06	2.83E-04	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	–	KM TEQ PCB	3.59E-06	–	9.73E-06	–	mg/kg	North	NA	100	-	9.73E-06	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																				
	Fish	Fillet	White Perch	–	Total Non-DL PCBs	1.97E-01	J	6.47E-01	J	mg/kg	Central	NA	100	-	6.47E-01	J	2.08E-03	ca	–	Y	Max > screening val
	PAHs																				
	Fish	Fillet	White Perch	90-12-0	1-Methylnaphthalene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	1.43E-01	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	91-57-6	2-Methylnaphthalene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E-01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	83-32-9	Acenaphthene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	5.21E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	208-96-8	Acenaphthylene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	5.21E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	120-12-7	Anthracene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	56-55-3	Benz(a)anthracene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	50-32-8	Benzo(a)pyrene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	205-99-2	Benzo(b)fluoranthene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	192-97-2	Benzo(e)pyrene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	191-24-2	Benzo(g,h,i)perylene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	–	Benzo(j,k)Fluoranthene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.47E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	–	C1-Chrysenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	–	C1-Fluoranthenes/Pyrenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	–	C1-Fluorenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	–	C1-Naphthalenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E-01	nc	–	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	White Perch	--	C1-Phenanthrenes/Anthracenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C2-Chrysenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C2-Fluoranthenes/Pyrenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C2-Fluorenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C2-Naphthalenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C2-Phenanthrenes/Anthracenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C3-Chrysenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C3-Fluoranthenes/Pyrenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C3-Fluorenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C3-Naphthalenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C3-Phenanthrenes/Anthracenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C4-Chrysenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C4-Naphthalenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	--	C4-Phenanthrenes/anthracenes	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	218-01-9	Chrysene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	53-70-3	Dibenz(a,h)anthracene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	206-44-0	Fluoranthene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	86-73-7	Fluorene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	193-39-5	Indeno(1,2,3-c,d)-pyrene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	4.16E-02	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	91-20-3	Naphthalene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	198-55-0	Perylene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	85-01-8	Phenanthrene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	129-00-0	Pyrene	1.30E-02	U	1.30E-02	U	mg/kg	Central, North, South	NA	0	1.30E-02 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Pesticides & Organics																				
	Fish	Fillet	White Perch	122-66-7	1,2-Diphenylhydrazine	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.20E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	95-94-3	1,2,4,5-Tetrachlorobenzene	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	91-58-7	2-Chloronaphthalene	2.60E-02	U	1.30E-01	U	mg/kg	Central, North, South	NA	0	2.60E-02 - 1.30E-01	1.30E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	95-57-8	2-Chlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	88-74-4	2-Nitroaniline	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	88-75-5	2-Nitrophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	58-90-2	2,3,4,6-Tetrachlorophenol	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	120-83-2	2,4-Dichlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	105-67-9	2,4-Dimethylphenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	51-28-5	2,4-Dinitrophenol	1.20E+00	U	6.00E+00	U	mg/kg	Central, North, South	NA	0	1.20E+00 - 6.00E+00	6.00E+00	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	121-14-2	2,4-Dinitrotoluene	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	95-95-4	2,4,5-Trichlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	88-06-2	2,4,6-Trichlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	53-19-0	2,4'-DDD	2.71E-03	--	1.01E-01	J	mg/kg	South	NA	100	4.98E-06 - 4.98E-06	1.01E-01	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	White Perch	3424-82-6	2,4'-DDE	1.73E-03	--	2.13E-02	--	mg/kg	North	NA	100	9.95E-06 - 9.95E-06	2.13E-02	--	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	789-02-6	2,4'-DDT	1.04E-04	--	3.04E-02	J	mg/kg	North	NA	100	1.08E-05 - 1.08E-05	3.04E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	606-20-2	2,6-Dinitrotoluene	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	99-09-2	3-Nitroaniline	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	91-94-1	3,3'-Dichlorobenzidine	3.90E-01	U	2.00E+00	U	mg/kg	Central, North, South	NA	0	3.90E-01 - 2.00E+00	2.00E+00	U	9.24E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	101-55-3	4-Bromophenyl phenyl ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	White Perch	59-50-7	4-Chloro-3-Methylphenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	106-47-8	4-Chloroaniline	1.30E-01	U	6.70E-01	U	mg/kg	Central, South	NA	0	1.30E-01 - 6.70E-01	6.70E-01	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	7005-72-3	4-Chlorophenyl phenyl ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	White Perch	106-44-5	4-Methylphenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	100-01-6	4-Nitroaniline	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	100-02-7	4-Nitrophenol	6.50E-01	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 3.30E+00	3.30E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	72-54-8	4,4'-DDD	9.73E-03	--	3.93E-01	J	mg/kg	North	NA	100	7.35E-06 - 7.35E-06	3.93E-01	J	2.61E-03	nc	--	Y	Max > screening val
	Fish	Fillet	White Perch	72-55-9	4,4'-DDE	2.72E-02	J	2.49E-01	J	mg/kg	North	NA	100	7.58E-06 - 7.58E-06	2.49E-01	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	50-29-3	4,4'-DDT	6.02E-04	--	6.35E-02	J	mg/kg	South	NA	100	9.40E-06 - 9.40E-06	6.35E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	534-52-1	4,6-Dinitro-2-methylphenol	6.50E-01	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 3.30E+00	3.30E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	98-86-2	Acetophenone	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	309-00-2	Aldrin	1.35E-05	J	1.09E-04	--	mg/kg	Central	NA	100	9.16E-06 - 9.16E-06	1.09E-04	--	2.45E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	319-84-6	Alpha-BHC	6.40E-06	U	1.96E-04	J	mg/kg	North	NA	85	6.40E-06 - 6.40E-06	1.96E-04	J	6.60E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	1912-24-9	Atrazine	1.30E-01	U	6.70E-01	U	mg/kg	Central, South	NA	0	1.30E-01 - 6.70E-01	6.70E-01	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	100-52-7	Benzaldehyde	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	1.04E+00	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	92-87-5	Benzidine	9.70E-01	U	5.00E+00	U	mg/kg	Central, North, South	NA	0	9.70E-01 - 5.00E+00	5.00E+00	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Fish	Fillet	White Perch	65-85-0	Benzoic Acid	6.50E-01	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 3.30E+00	3.30E+00	U	3.48E+02	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	White Perch	319-85-7	Beta-BHC	1.11E-05	U	5.37E-05	--	mg/kg	North	NA	95	1.11E-05 - 1.11E-05	5.37E-05	--	2.31E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	92-52-4	Biphenyl	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.20E-01	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	108-60-1	Bis(2-chloro-1-methylethyl) ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	111-91-1	bis(2-Chloroethoxy)methane	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	111-44-4	bis(2-Chloroethyl)ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	3.78E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	117-81-7	bis(2-Ethylhexyl)phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.97E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	85-68-7	Butyl benzyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.19E+00	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	105-60-2	Caprolactam	1.30E-01	U	6.70E-01	U	mg/kg	Central, South	NA	0	1.30E-01 - 6.70E-01	6.70E-01	U	4.35E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	86-74-8	Carbazole	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	5103-71-9	Chlordane, alpha (cis)	6.03E-03	--	5.52E-02	J	mg/kg	Central	NA	100	8.83E-06 - 8.83E-06	5.52E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	5103-74-2	Chlordane, gamma (trans)	1.11E-03	--	1.13E-02	--	mg/kg	Central	NA	100	1.37E-05 - 1.37E-05	1.13E-02	--	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	319-86-8	Delta-BHC	4.35E-06	J	5.16E-06	J	mg/kg	North	NA	20	5.08E-06 - 5.08E-06	5.16E-06	J	6.60E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	84-74-2	Di-n-butyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	117-84-0	Di-n-octyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	132-64-9	Dibenzofuran	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	1002-53-5	Dibutyltin	1.30E-03	U	1.30E-03	U	mg/kg	Central, North, South	NA	0	1.30E-03 - 1.30E-03	1.30E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	60-57-1	Dieldrin	2.70E-03	--	1.17E-02	--	mg/kg	Central	NA	100	1.54E-05 - 1.54E-05	1.17E-02	--	2.60E-04	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	84-66-2	Diethyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	131-11-3	Dimethyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	959-98-8	Endosulfan I	5.74E-05	U	5.74E-05	U	mg/kg	Central, North, South	NA	0	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	Central, North, South	NA	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	1031-07-8	Endosulfan Sulfate	5.51E-05	J	6.33E-05	U	mg/kg	Central, North, South	NA	5	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	White Perch	72-20-8	Endrin	1.33E-05	J	7.54E-05	--	mg/kg	South	NA	60	1.39E-05 - 1.39E-05	7.54E-05	--	2.61E-02	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.31E-04	U	mg/kg	Central, North, South	NA	0	1.31E-04 - 1.31E-04	1.31E-04	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	53494-70-5	Endrin Ketone	7.60E-05	U	1.00E-04	J	mg/kg	South	NA	12	7.60E-05 - 7.60E-05	1.00E-04	J	2.61E-02	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	58-89-9	Gamma-BHC (Lindane)	7.69E-06	U	2.53E-05	J	mg/kg	North	NA	75	7.69E-06 - 7.69E-06	2.53E-05	J	3.78E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	76-44-8	Heptachlor	8.12E-06	J	3.65E-05	J	mg/kg	Central	NA	60	3.25E-05 - 3.25E-05	3.65E-05	J	9.24E-04	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	1024-57-3	Heptachlor epoxide, cis-	5.40E-04	--	4.70E-03	--	mg/kg	Central	NA	100	7.00E-06 - 7.00E-06	4.70E-03	--	4.57E-04	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	28044-83-9	Heptachlor epoxide, trans-	1.70E-05	U	1.70E-05	U	mg/kg	Central, North, South	NA	0	1.70E-05 - 1.70E-05	1.70E-05	U	4.57E-04	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	118-74-1	Hexachlorobenzene	5.02E-04	J	2.22E-03	J	mg/kg	Central	NA	100	4.06E-06 - 4.06E-06	2.22E-03	J	2.60E-03	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	87-68-3	Hexachlorobutadiene	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.33E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	77-47-4	Hexachlorocyclopentadiene	6.50E-01	U	3.30E+00	U	mg/kg	Central, North, South	NA	0	6.50E-01 - 3.30E+00	3.30E+00	U	5.21E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	67-72-1	Hexachloroethane	1.30E-01	U	6.70E-01	U	mg/kg	Central, South	NA	0	1.30E-01 - 6.70E-01	6.70E-01	U	6.08E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	78-59-1	Isophorone	6.60E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	15	6.50E-02 - 3.30E-01	3.30E-01	U	4.38E+00	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	72-43-5	Methoxychlor	3.89E-05	U	3.89E-05	U	mg/kg	Central, North, South	NA	0	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	2385-85-5	Mirex	8.40E-05	--	9.42E-04	--	mg/kg	North	NA	100	9.33E-06 - 9.33E-06	9.42E-04	--	2.31E-04	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	2406-65-7	Monobutyltin	2.00E-02	U	2.10E-02	U	mg/kg	Central, North, South	NA	0	2.00E-02 - 2.10E-02	2.10E-02	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	621-64-7	N-Nitroso-di-n-propylamine	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.94E-04	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	86-30-6	N-Nitrosodiphenylamine	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.49E-01	ca	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	98-95-3	Nitrobenzene	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	5103-73-1	Nonachlor, cis-	2.41E-03	--	1.18E-02	--	mg/kg	Central	NA	100	1.26E-05 - 1.26E-05	1.18E-02	--	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	39765-80-5	Nonachlor, trans-	5.91E-03	J	3.00E-02	J	mg/kg	Central	NA	100	1.04E-05 - 1.04E-05	3.00E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Fish	Fillet	White Perch	95-48-7	o-Cresol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	4.35E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	27304-13-8	Oxychlordane	1.08E-03	--	4.53E-03	--	mg/kg	South	NA	100	1.00E-05 - 1.00E-05	4.53E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	87-86-5	Pentachlorophenol	1.30E-01	U	6.70E-01	U	mg/kg	Central, South	NA	0	1.30E-01 - 6.70E-01	6.70E-01	U	1.04E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	108-95-2	Phenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, North, South	NA	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	110-86-1	Pyridine	2.60E-01	U	1.30E+00	U	mg/kg	Central, North, South	NA	0	2.60E-01 - 1.30E+00	1.30E+00	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	1461-25-2	Tetrabutyltin	1.60E-03	U	1.70E-03	U	mg/kg	Central, North, South	NA	0	1.60E-03 - 1.70E-03	1.70E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	688-73-3	Tributyltin	1.50E-03	U	1.90E-03	J	mg/kg	North	NA	5	1.50E-03 - 1.50E-03	1.90E-03	J	2.61E-02	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Inorganics																				
	Fish	Fillet	White Perch	7429-90-5	Aluminum	4.31E+00	U	1.52E+01	J	mg/kg	Central	NA	10	4.31E+00 - 5.60E+00	1.52E+01	J	8.69E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	7440-36-0	Antimony	5.08E-02	U	6.60E-02	U	mg/kg	North	NA	0	5.08E-02 - 6.60E-02	6.60E-02	U	3.48E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	7440-38-2	Arsenic, organic	2.70E-01	J	1.07E+00	J	mg/kg	South	NA	100	1.04E-01 - 1.35E-01	1.07E+00	J	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	7440-38-2	Arsenic, inorganic	3.00E-02	J	1.19E-01	J	mg/kg	South	NA	100	1.15E-02 - 1.50E-02	1.19E-01	J	2.77E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	7440-39-3	Barium	1.42E-01	U	3.48E-01	J	mg/kg	North	NA	20	1.42E-01 - 1.84E-01	3.48E-01	J	1.74E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	7440-41-7	Beryllium	1.09E-02	U	1.42E-02	U	mg/kg	North	NA	0	1.09E-02 - 1.42E-02	1.42E-02	U	1.74E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	7440-43-9	Cadmium	3.54E-02	U	4.60E-02	U	mg/kg	North	NA	0	3.54E-02 - 4.60E-02	4.60E-02	U	8.69E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	7440-70-2	Calcium	3.29E+02	--	4.57E+03	--	mg/kg	North	NA	100	1.43E+01 - 1.86E+01	4.57E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	White Perch	7440-47-3	Chromium [as Cr(III)]	8.06E-02	U	2.78E-01	J	mg/kg	Central	NA	70	7.69E-02 - 1.00E-01	2.78E-01	J	8.32E-03	ca	Carc	Y	Known human carcinogen
	Fish	Fillet	White Perch	7440-48-4	Cobalt	1.54E-02	U	2.00E-02	U	mg/kg	North	NA	0	1.54E-02 - 2.00E-02	2.00E-02	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	7440-50-8	Copper	5.41E-01	--	8.01E-01	--	mg/kg	North	NA	100	6.15E-02 - 8.00E-02	8.01E-01	--	3.48E+00	nc	--	N	Max ≤ screening val

TABLE 3-10
RAGS PART D TABLE 2.3: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – FISH
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration (3)	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (4)	Qualifier	Screening Toxicity Value (5)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (6)
Biota																					
	Fish	Fillet	White Perch	7439-89-6	Iron	4.49E+00	U	7.55E+00	J	mg/kg	North	NA	95	3.55E+00 - 4.62E+00	7.55E+00	J	6.08E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	7439-92-1	Lead	2.26E-02	U	1.03E-01	J	mg/kg	Central	NA	75	2.00E-02 - 2.60E-02	1.03E-01	J	1.50E+00	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	7439-95-4	Magnesium	2.50E+02	--	4.33E+02	--	mg/kg	North	NA	100	2.60E+00 - 3.38E+00	4.33E+02	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	White Perch	7439-96-5	Manganese	1.29E-01	U	8.71E-01	--	mg/kg	South	NA	55	1.29E-01 - 1.68E-01	8.71E-01	--	1.22E+01	nc	--	N	Max ≤ screening val
	Fish	Fillet	White Perch	7439-97-6	Mercury	1.33E-01	--	4.42E-01	--	mg/kg	Central	NA	100	1.88E-03 - 2.12E-03	4.42E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Fish	Fillet	White Perch	22967-92-6	Methyl Mercury	1.53E-01	--	7.38E-01	--	mg/kg	Central	NA	100	2.10E-03 - 4.50E-03	7.38E-01	--	8.69E-03	nc	--	Y	Max > screening val
	Fish	Fillet	White Perch	7440-02-0	Nickel	1.45E-01	U	1.88E-01	U	mg/kg	North	NA	0	1.45E-01 - 1.88E-01	1.88E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	7440-09-7	Potassium	3.49E+03	--	4.49E+03	--	mg/kg	North	NA	100	9.42E+00 - 1.22E+01	4.49E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	White Perch	7782-49-2	Selenium	4.72E-01	--	8.11E-01	--	mg/kg	South	NA	100	7.69E-02 - 1.00E-01	8.11E-01	--	4.35E-01	nc	--	Y	Max > screening val
	Fish	Fillet	White Perch	7440-22-4	Silver	1.54E-02	U	2.00E-02	U	mg/kg	North	NA	0	1.54E-02 - 2.00E-02	2.00E-02	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Fish	Fillet	White Perch	7440-23-5	Sodium	5.54E+02	--	1.05E+03	--	mg/kg	Central	NA	100	8.62E+00 - 1.12E+01	1.05E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Fish	Fillet	White Perch	7440-28-0	Thallium	2.31E-02	U	3.00E-02	U	mg/kg	North	NA	0	2.31E-02 - 3.00E-02	3.00E-02	U	8.69E-04	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Fish	Fillet	White Perch	7440-32-6	Titanium	2.85E-01	U	3.70E-01	U	mg/kg	North	NA	0	2.85E-01 - 3.70E-01	3.70E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Fish	Fillet	White Perch	7440-62-2	Vanadium	2.31E-02	U	3.43E-02	J	mg/kg	North	NA	5	2.31E-02 - 3.00E-02	3.43E-02	J	4.38E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Fish	Fillet	White Perch	7440-66-6	Zinc	6.87E+00	--	1.87E+01	--	mg/kg	North	NA	100	5.69E-01 - 7.40E-01	1.87E+01	--	2.61E+01	nc	--	N	Max ≤ screening val

Definitions
ARAR - Applicable or Relevant and Appropriate Requirements, ca - based on carcinogenic effects, Carc - known human carcinogen, chem - chemical, chems - chemicals, COPC - chemical of potential concern, cPAH - carcinogenic PAH, DF - dioxin/furan, DL - detection limit, DLC - dioxin-like compound, eval - evaluate, gen - general, ID - identify,
KM - Kaplan-Meier, max - maximum, nc-noncancer, non-DL - nondioxin-like, m - federal MCL, MCL - maximum contaminant level, NA - not applicable, nc - based on noncarcinogenic effects, N - no, NBE - Newark Bay east, NBN - Newark Bay north, NBS - Newark Bay south, NDL-PCB - nondioxin-like PCB, NNE - north-northeast, NNW - north-northwest,
NJ - based on New Jersey Department of Environmental Protection Surface Water Quality Criteria for Human Health, Saline Water, param - parameter, PAH - polycyclic aromatic hydrocarbon, PCB - polychlorinated biphenyl, RSL - regional screening level, SV - small volume, TBC - To Be Considered, TEQ - toxicity equivalence,
µg/L - microgram per liter, UNC - evaluate in Uncertainty Section, USEPA - US Environmental Protection Agency, UNC - evaluate in Uncertainty Section, val - value, Y - yes

Notes
(1) Tissue samples were analyzed for total arsenic, which includes both inorganic and organic arsenic. As discussed in the text, it was assumed that 10% of the total arsenic in tissue is inorganic arsenic, and 90% of the total arsenic is organic arsenic.
(2) Qualifier codes: J - estimated value, U - not detected
(3) Specific Location of Maximum Concentration is not applicable to fish, since unlike crabs, fish are more mobile and do not remain in particular locations.
(4) The Concentration Used for Screening is the maximum reported concentration for a chemical. For non-detected chemicals, this concentration is equivalent to the maximum detection limit.
(5) Tissue screening levels were calculated using the USEPA RSL online calculator assuming an adult fish ingestion rate of 34.6 g/d, per the USEPA 2012 Technical Memorandum: Fish and Crab Consumption Rates for the LPRSA Human Health Risk Assessment. Some screening values are appropriate toxicity surrogates, when a value for the particular chemical is not available.
(6) Chemicals were screened according to procedures outlined in the risk assessment text. Briefly, detected known human carcinogens were retained; essential nutrients were excluded. Chemicals detected in ≤5% of samples were excluded as COPCs, but flagged for evaluation in the Uncertainty Section if their maximum concentration exceeds the screening value. Non-detected chemicals with detection limits above the screening value are discussed qualitatively for their uncertainty. All DLCs were retained; all 7 cPAHs were retained if at least 1 was a COPC. For the remaining chemicals, if the maximum concentration was ≤ the screening value, they were excluded. Chemicals lacking a screening value are discussed in the Uncertainty Section. Background concentrations were not considered in the screening process, and potential ARAR/TBC values were not relevant. Note that none of the cPAHs were identified as COPCs in fish.

Reference
USEPA 2012. Technical Memorandum Fish and Crab Consumption Rates for the LPRSA Human Health Risk Assessment. February 2.

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Dioxin-like Compounds																			
	Crab	Hep + Muscle combined	1746-01-6	2,3,7,8-TCDD	5.05E-06	--	4.49E-05	--	mg/kg	North	N005	100	1.36E-08 - 1.01E-07	4.49E-05	--	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	40321-76-4	1,2,3,7,8-PeCDD	3.98E-08	U	1.26E-06	J	mg/kg	North	132	97	2.91E-08 - 1.32E-07	1.26E-06	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	39227-28-6	1,2,3,4,7,8-HxCDD	9.90E-08	J	2.94E-07	J	mg/kg	North	N005	100	9.81E-09 - 4.94E-08	2.94E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	57653-85-7	1,2,3,6,7,8-HxCDD	3.24E-07	J	8.85E-07	J	mg/kg	North	N005	100	1.01E-08 - 5.38E-08	8.85E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	19408-74-3	1,2,3,7,8,9-HxCDD	1.24E-07	J	2.88E-07	J	mg/kg	Central	C008	100	9.48E-09 - 4.95E-08	2.88E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	35822-46-9	1,2,3,4,6,7,8-HpCDD	3.99E-07	J	9.38E-07	J	mg/kg	North	N008	100	7.09E-09 - 3.13E-08	9.38E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	3268-87-9	OCDD	9.22E-07	J	5.95E-06	J	mg/kg	North	N008	100	7.38E-09 - 3.30E-08	5.95E-06	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	51207-31-9	2,3,7,8-TCDF	5.82E-06	J	1.60E-05	J	mg/kg	South	S009	100	3.98E-08 - 1.85E-07	1.60E-05	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	57117-41-6	1,2,3,7,8-PeCDF	1.13E-06	J	2.90E-06	J	mg/kg	North	N003	100	1.53E-08 - 7.94E-08	2.90E-06	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	57117-31-4	2,3,4,7,8-PeCDF	1.74E-06	J	6.94E-06	J	mg/kg	North	122	100	1.19E-08 - 6.39E-08	6.94E-06	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	70648-26-9	1,2,3,4,7,8-HxCDF	6.76E-07	J	8.86E-06	J	mg/kg	North	122	100	6.72E-09 - 4.75E-08	8.86E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	57117-44-9	1,2,3,6,7,8-HxCDF	4.90E-07	J	2.24E-06	J	mg/kg	North	N005	100	9.29E-09 - 5.66E-08	2.24E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	72918-21-9	1,2,3,7,8,9-HxCDF	3.06E-08	J	1.32E-07	J	mg/kg	North	N003	100	7.71E-09 - 5.97E-08	1.32E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	60851-34-5	2,3,4,6,7,8-HxCDF	1.73E-07	J	6.05E-07	J	mg/kg	North	122	100	7.42E-09 - 5.23E-08	6.05E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	67562-39-4	1,2,3,4,6,7,8-HpCDF	1.01E-06	J	9.54E-06	J	mg/kg	North	133	100	1.38E-08 - 5.36E-08	9.54E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	55673-89-7	1,2,3,4,7,8,9-HpCDF	2.14E-08	J	1.41E-07	J	mg/kg	North	N005	81	1.80E-08 - 6.69E-08	1.41E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	39001-02-0	OCDF	1.05E-07	J	5.78E-07	J	mg/kg	North	122	100	6.55E-09 - 3.67E-08	5.78E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	--	KM TEQ DF	7.30E-06	--	4.98E-05	--	mg/kg	North	N005	100	-	4.98E-05	--	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	32598-13-3	PCB-77	7.46E-04	J	2.51E-03	J	mg/kg	Central	C002	100	1.37E-06 - 2.85E-06	2.51E-03	J	3.20E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	70362-50-4	PCB-81	4.16E-05	--	1.42E-04	--	mg/kg	North	N007	100	1.73E-06 - 1.24E-05	1.42E-04	--	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	32598-14-4	PCB-105	4.12E-03	J	1.57E-02	J	mg/kg	North	N007	100	1.64E-06 - 1.17E-05	1.57E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	74472-37-0	PCB-114	4.21E-04	J	1.39E-03	--	mg/kg	North	N007	100	1.45E-06 - 1.04E-05	1.39E-03	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	31508-00-6	PCB-118	2.12E-02	J	6.89E-02	J	mg/kg	North	N007	100	2.90E-06 - 2.07E-05	6.89E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	65510-44-3	PCB-123	4.18E-04	J	1.25E-03	--	mg/kg	North	N007	100	1.64E-06 - 1.17E-05	1.25E-03	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	57465-28-8	PCB-126	6.33E-06	J	1.58E-04	--	mg/kg	North	N007	100	1.54E-06 - 1.10E-05	1.58E-04	--	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	--	PCB-156/157	1.75E-03	J	5.34E-03	J	mg/kg	North	N007	100	2.22E-06 - 1.59E-05	5.34E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	52663-72-6	PCB-167	7.59E-04	J	2.26E-03	J	mg/kg	North	N007	100	1.26E-06 - 8.97E-06	2.26E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	32774-16-6	PCB-169	1.45E-06	U	5.49E-05	J	mg/kg	North	133	38	1.45E-06 - 1.04E-05	5.49E-05	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	39635-31-9	PCB-189	1.16E-04	--	4.04E-04	--	mg/kg	North	N007	100	1.26E-06 - 8.97E-06	4.04E-04	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	--	KM TEQ PCB	1.56E-06	J	1.88E-05	--	mg/kg	North	N007	100	-	1.88E-05	--	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																			
	Crab	Hep + Muscle combined	--	Total Non-DL PCBs	1.59E-01	J	4.91E-01	J	mg/kg	North	N007	100	-	4.91E-01	J	2.08E-03	ca	--	Y	Max > screening val
	PAHs																			
	Crab	Hep + Muscle combined	90-12-0	1-Methylnaphthalene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	24	2.60E-03 - 1.30E-02	1.30E-02	U	1.43E-01	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	91-57-6	2-Methylnaphthalene	2.60E-03	U	2.00E-02	J	mg/kg	North	N001	65	2.60E-03 - 1.30E-02	2.00E-02	J	3.48E-01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	83-32-9	Acenaphthene	2.67E-03	U	3.13E-02	J	mg/kg	North	N001	89	2.60E-03 - 1.30E-02	3.13E-02	J	5.21E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	208-96-8	Acenaphthylene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	30	2.60E-03 - 1.30E-02	1.30E-02	U	5.21E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	120-12-7	Anthracene	2.60E-03	U	1.26E-01	J	mg/kg	Central	126	65	2.60E-03 - 1.30E-02	1.26E-01	J	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	56-55-3	Benz(a)anthracene	2.60E-03	U, J	1.30E-02	U	mg/kg	South	S007	24	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hep + Muscle combined	50-32-8	Benzo(a)pyrene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hep + Muscle combined	205-99-2	Benzo(b)fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hep + Muscle combined	192-97-2	Benzo(e)pyrene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	191-24-2	Benzo(g,h,i)perylene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	11	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	Benzo(j,k)Fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	3.47E-03	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Hep + Muscle combined	--	C1-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	--	C1-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	--	C1-Fluorenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C1-Naphthalenes	2.60E-03	U	2.52E-02	--	mg/kg	North	N001	62	2.60E-03 - 1.30E-02	2.52E-02	--	3.48E-01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C1-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	11	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C2-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hep + Muscle combined	--	C2-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	--	C2-Fluorenes	2.60E-03	U	4.09E-02	J	mg/kg	Central	C008	8	2.60E-03 - 1.30E-02	4.09E-02	J	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C2-Naphthalenes	2.60E-03	U	1.91E-02	--	mg/kg	North	N001	35	2.60E-03 - 1.30E-02	1.91E-02	--	3.48E-01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C2-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C3-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	--	C3-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	--	C3-Fluorenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C3-Naphthalenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	14	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E-01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C3-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hep + Muscle combined	--	C4-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	--	C4-Naphthalenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E-01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	--	C4-Phenanthrenes/anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hep + Muscle combined	218-01-9	Chrysene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	38	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hep + Muscle combined	53-70-3	Dibenz(a,h)anthracene	2.60E-03	U, J	1.30E-02	U	mg/kg	South	S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hep + Muscle combined	206-44-0	Fluoranthene	2.67E-03	U	1.34E-02	J	mg/kg	North	N001	86	2.60E-03 - 1.30E-02	1.34E-02	J	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	86-73-7	Fluorene	2.60E-03	U	3.34E-01	J	mg/kg	Central	126	11	2.60E-03 - 1.30E-02	3.34E-01	J	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	193-39-5	Indeno(1,2,3-c,d)-pyrene	2.60E-03	U	1.37E-01	J	mg/kg	North	122	5	2.60E-03 - 1.30E-02	1.37E-01	J	4.16E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hep + Muscle combined	91-20-3	Naphthalene	2.60E-03	U	1.59E-02	J	mg/kg	North	N001	38	2.60E-03 - 1.30E-02	1.59E-02	J	1.74E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	198-55-0	Perylene	2.60E-03	U	1.30E-02	U	mg/kg	South	S007	43	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	85-01-8	Phenanthrene	2.60E-03	U	4.36E-02	J	mg/kg	Central	126	59	2.60E-03 - 1.30E-02	4.36E-02	J	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	129-00-0	Pyrene	2.67E-03	U	1.30E-02	U	mg/kg	South	S007	89	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Max ≤ screening val
	Pesticides & Organics																			
	Crab	Hep + Muscle combined	122-66-7	1,2-Diphenylhydrazine	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	3	6.53E-02 - 4.13E-01	4.13E-01	U	5.20E-03	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Hep + Muscle combined	95-94-3	1,2,4,5-Tetrachlorobenzene	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	91-58-7	2-Chloronaphthalene	2.73E-02	U	1.66E-01	U	mg/kg	South	S008	0	2.73E-02 - 1.66E-01	1.66E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	95-57-8	2-Chlorophenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	88-74-4	2-Nitroaniline	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	88-75-5	2-Nitrophenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	58-90-2	2,3,4,6-Tetrachlorophenol	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	120-83-2	2,4-Dichlorophenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	105-67-9	2,4-Dimethylphenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	51-28-5	2,4-Dinitrophenol	1.20E+00	U	7.49E+00	U	mg/kg	South	S008	0	1.20E+00 - 7.49E+00	7.49E+00	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	121-14-2	2,4-Dinitrotoluene	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	95-95-4	2,4,5-Trichlorophenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	88-06-2	2,4,6-Trichlorophenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	53-19-0	2,4'-DDD	4.98E-06	U	8.92E-04	--	mg/kg	South	S001	97	4.98E-06 - 4.98E-06	8.92E-04	--	2.61E-03	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	3424-82-6	2,4'-DDE	9.95E-06	U	1.72E-03	--	mg/kg	South	130	97	9.95E-06 - 9.95E-06	1.72E-03	--	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	789-02-6	2,4'-DDT	1.08E-05	U	1.03E-03	--	mg/kg	South	S001	84	1.08E-05 - 1.08E-05	1.03E-03	--	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	606-20-2	2,6-Dinitrotoluene	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	99-09-2	3-Nitroaniline	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	91-94-1	3,3'-Dichlorobenzidine	3.90E-01	U	2.49E+00	U	mg/kg	South	S008	3	3.90E-01 - 2.49E+00	2.49E+00	U	9.24E-03	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Hep + Muscle combined	101-55-3	4-Bromophenyl phenyl ether	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Hep + Muscle combined	59-50-7	4-Chloro-3-Methylphenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	106-47-8	4-Chloroaniline	1.30E-01	U	8.26E-01	U	mg/kg	South	S008	0	1.30E-01 - 8.26E-01	8.26E-01	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	7005-72-3	4-Chlorophenyl phenyl ether	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Hep + Muscle combined	106-44-5	4-Methylphenol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	3	6.53E-02 - 4.13E-01	4.13E-01	U	8.69E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hep + Muscle combined	100-01-6	4-Nitroaniline	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	100-02-7	4-Nitrophenol	6.53E-01	U	4.13E+00	U	mg/kg	South	S008	0	6.53E-01 - 4.13E+00	4.13E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	72-54-8	4,4'-DDD	8.72E-03	J	1.34E-01	J	mg/kg	South	134	100	7.35E-06 - 7.35E-06	1.34E-01	J	2.61E-03	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	72-55-9	4,4'-DDE	3.33E-02	J	1.91E-01	J	mg/kg	South	130	100	7.58E-06 - 7.58E-06	1.91E-01	J	1.22E-02	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	50-29-3	4,4'-DDT	6.78E-05	J	3.67E-03	J	mg/kg	South	S001	100	9.40E-06 - 9.40E-06	3.67E-03	J	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	534-52-1	4,6-Dinitro-2-methylphenol	6.53E-01	U	4.13E+00	U	mg/kg	South	S008	0	6.53E-01 - 4.13E+00	4.13E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	98-86-2	Acetophenone	6.53E-02	U	5.56E-01	J	mg/kg	Central	C008	6	6.53E-02 - 4.13E-01	5.56E-01	J	8.69E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	309-00-2	Aldrin	8.29E-06	J	1.10E-05	J	mg/kg	North	N007	12	9.16E-06 - 9.16E-06	1.10E-05	J	2.45E-04	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	319-84-6	Alpha-BHC	1.51E-05	J	4.12E-05	J	mg/kg	North	N007	100	6.40E-06 - 6.40E-06	4.12E-05	J	6.60E-04	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	1912-24-9	Atrazine	1.30E-01	U	8.26E-01	U	mg/kg	South	S008	0	1.30E-01 - 8.26E-01	8.26E-01	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	100-52-7	Benzaldehyde	2.86E-01	J	2.31E+00	J	mg/kg	South	S004	69	2.60E-01 - 1.64E+00	2.31E+00	J	1.04E+00	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	92-87-5	Benzidine	2.73E+00	U	1.74E+01	U	mg/kg	South	S008	0	2.73E+00 - 1.74E+01	1.74E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Crab	Hep + Muscle combined	65-85-0	Benzoic Acid	6.53E-01	U	5.56E+00	J	mg/kg	Central	124	46	6.53E-01 - 4.13E+00	5.56E+00	J	3.48E+02	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	319-85-7	Beta-BHC	9.80E-06	J	1.60E-04	J	mg/kg	North	N007	100	1.11E-05 - 1.11E-05	1.60E-04	J	2.31E-03	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	92-52-4	Biphenyl	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	5.20E-01	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	108-60-1	Bis(2-chloro-1-methylethyl) ether	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	111-91-1	bis(2-Chloroethoxy)methane	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	111-44-4	bis(2-Chloroethyl)ether	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	3.78E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	117-81-7	bis(2-Ethylhexyl)phthalate	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	2.97E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	85-68-7	Butyl benzyl phthalate	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	2.19E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	105-60-2	Caprolactam	1.30E-01	U	8.26E-01	U	mg/kg	South	S008	0	1.30E-01 - 8.26E-01	8.26E-01	U	4.35E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	86-74-8	Carbazole	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	5103-71-9	Chlordane, alpha (cis)	3.80E-04	--	3.85E-03	--	mg/kg	Central	127	100	8.83E-06 - 8.83E-06	3.85E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	5103-74-2	Chlordane, gamma (trans)	1.37E-05	U	4.29E-04	J	mg/kg	North	N007	93	1.37E-05 - 1.37E-05	4.29E-04	J	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	319-86-8	Delta-BHC	5.08E-06	U	1.47E-05	J	mg/kg	South	134	9	5.08E-06 - 5.08E-06	1.47E-05	J	6.60E-04	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	84-74-2	Di-n-butyl phthalate	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	117-84-0	Di-n-octyl phthalate	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	132-64-9	Dibenzofuran	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	1002-53-5	Dibutyltin	1.20E-03	U	1.52E-03	U	mg/kg	North	133	11	1.20E-03 - 1.52E-03	1.52E-03	U	2.61E-02	nc	--	N	Max ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hep + Muscle combined	60-57-1	Dieldrin	1.76E-03	J	9.38E-03	J	mg/kg	Central	C007	100	1.54E-05 - 1.54E-05	9.38E-03	J	2.60E-04	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	84-66-2	Diethyl phthalate	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	131-11-3	Dimethyl phthalate	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	0	2.60E-01 - 1.64E+00	1.64E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	959-98-8	Endosulfan I	4.90E-05	J	5.74E-05	U	mg/kg	North, Central, South	122, 124, 125, 126, 127, 129, 131, 133, C001, C003, C004, C005, C007, C008, N001, N002, S001, S002, S003, S004, S006, S007	4	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hep + Muscle combined	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	1031-07-8	Endosulfan Sulfate	6.26E-05	J	6.33E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 131, 132, 134, C001, C002, C003, C004, C006, C007, C008, N002, N003, N005, N006, N008, S001, S002, S004, S006, S007, S008, S009	3	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hep + Muscle combined	72-20-8	Endrin	1.39E-05	U	1.39E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	1.39E-05 - 1.39E-05	1.39E-05	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.46E-04	J	mg/kg	South	134	17	1.31E-04 - 1.31E-04	1.46E-04	J	2.61E-02	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	53494-70-5	Endrin Ketone	7.60E-05	U	7.60E-05	U	mg/kg	North, Central, South	122, 125, 126, 127, 129, C001, C003, C006, C007, C008, N002, N008, S002, S003, S004, S006, S007	0	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	58-89-9	Gamma-BHC (Lindane)	4.45E-06	J	2.05E-05	J	mg/kg	North	N007	84	7.69E-06 - 7.69E-06	2.05E-05	J	3.78E-03	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	76-44-8	Heptachlor	2.45E-05	J	3.25E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, S001, S002, S003, S004, S005, S006, S007, S008, S009	5	3.25E-05 - 3.25E-05	3.25E-05	U	9.24E-04	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	1024-57-3	Heptachlor epoxide, cis-	1.43E-03	--	1.05E-02	J	mg/kg	North	N007	100	7.00E-06 - 7.00E-06	1.05E-02	J	4.57E-04	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	28044-83-9	Heptachlor epoxide, trans-	4.09E-04	--	2.54E-03	--	mg/kg	North	N007	100	1.70E-05 - 1.70E-05	2.54E-03	--	4.57E-04	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	118-74-1	Hexachlorobenzene	4.67E-04	J	2.46E-03	J	mg/kg	North	N007	100	4.06E-06 - 4.06E-06	2.46E-03	J	2.60E-03	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	87-68-3	Hexachlorobutadiene	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	5.33E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	77-47-4	Hexachlorocyclopentadiene	6.53E-01	U	4.13E+00	U	mg/kg	South	S008	0	6.53E-01 - 4.13E+00	4.13E+00	U	5.21E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	67-72-1	Hexachloroethane	1.30E-01	U	8.26E-01	U	mg/kg	South	S008	0	1.30E-01 - 8.26E-01	8.26E-01	U	6.08E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	78-59-1	Isophorone	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	4.38E+00	ca	--	N	Not detected, max DL ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hep + Muscle combined	72-43-5	Methoxychlor	3.89E-05	U	3.89E-05	U	mg/kg	North, Central, South	122, 124, 125, 126, 127, 129, 130, 131, C001, C003, C004, C006, C007, C008, N001, N002, N008, S001, S002, S003, S004, S006, S007, S008	0	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	2385-85-5	Mirex	1.11E-04	J	2.87E-04	J	mg/kg	Central	C002	100	9.33E-06 - 9.33E-06	2.87E-04	J	2.31E-04	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	2406-65-7	Monobutyltin	2.00E-02	U	2.37E-02	U	mg/kg	North	133	0	2.00E-02 - 2.37E-02	2.37E-02	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	621-64-7	N-Nitroso-di-n-propylamine	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	5.94E-04	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	86-30-6	N-Nitrosodiphenylamine	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	8.49E-01	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	98-95-3	Nitrobenzene	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	5103-73-1	Nonachlor, cis-	2.55E-03	J	1.15E-02	J	mg/kg	North	N007	100	1.26E-05 - 1.26E-05	1.15E-02	J	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	39765-80-5	Nonachlor, trans-	2.08E-03	J	2.37E-02	J	mg/kg	North	N007	100	1.04E-05 - 1.04E-05	2.37E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	95-48-7	o-Cresol	6.53E-02	U	4.13E-01	U	mg/kg	South	S008	0	6.53E-02 - 4.13E-01	4.13E-01	U	4.35E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	27304-13-8	Oxychlordane	5.84E-03	J	3.45E-02	J	mg/kg	North	N007	100	1.00E-05 - 1.00E-05	3.45E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Crab	Hep + Muscle combined	87-86-5	Pentachlorophenol	1.30E-01	U	8.26E-01	U	mg/kg	South	S008	0	1.30E-01 - 8.26E-01	8.26E-01	U	1.04E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	108-95-2	Phenol	6.53E-02	U	4.18E-01	J	mg/kg	South	S008	20	6.53E-02 - 4.13E-01	4.18E-01	J	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	110-86-1	Pyridine	2.60E-01	U	1.64E+00	U	mg/kg	South	S008	17	2.60E-01 - 1.64E+00	1.64E+00	U	8.69E-02	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	1461-25-2	Tetrabutyltin	1.60E-03	U	1.92E-03	U	mg/kg	North	133	0	1.60E-03 - 1.92E-03	1.92E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	688-73-3	Tributyltin	1.40E-03	U	1.72E-03	U	mg/kg	North	133	0	1.40E-03 - 1.72E-03	1.72E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Inorganics																			
	Crab	Hep + Muscle combined	7429-90-5	Aluminum	5.38E+00	U	2.78E+01	J	mg/kg	North	122	47	5.37E+00 - 5.58E+00	2.78E+01	J	8.69E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	7440-36-0	Antimony	6.33E-02	U	2.28E-01	J	mg/kg	North	N004	3	6.33E-02 - 6.58E-02	2.28E-01	J	3.48E-02	nc	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Hep + Muscle combined	7440-38-2	Arsenic, organic	1.35E+00	--	3.59E+00	--	mg/kg	South	S009	100	1.29E-01 - 1.35E-01	3.59E+00	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	7440-38-2	Arsenic, inorganic	1.51E-01	--	3.99E-01	--	mg/kg	South	S009	100	1.44E-02 - 1.50E-02	3.99E-01	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	7440-39-3	Barium	1.78E-01	U	3.95E+00	--	mg/kg	North	N006	97	1.76E-01 - 1.83E-01	3.95E+00	--	1.74E+01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	7440-41-7	Beryllium	1.36E-02	U	1.42E-02	U	mg/kg	North	N006	0	1.36E-02 - 1.42E-02	1.42E-02	U	1.74E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hep + Muscle combined	7440-43-9	Cadmium	1.31E-01	J	8.11E-01	J	mg/kg	Central	127	100	4.41E-02 - 4.59E-02	8.11E-01	J	8.69E-02	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7440-70-2	Calcium	1.18E+03	--	1.97E+04	--	mg/kg	North	N002	100	1.78E+01 - 2.49E+01	1.97E+04	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hep + Muscle combined	7440-47-3	Chromium [as Cr(III)]	9.62E-02	U	4.83E-01	J	mg/kg	South	S008	69	9.59E-02 - 9.97E-02	4.83E-01	J	8.32E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hep + Muscle combined	7440-48-4	Cobalt	4.71E-02	J	2.33E-01	--	mg/kg	North	122	100	1.91E-02 - 1.99E-02	2.33E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7440-50-8	Copper	1.58E+01	--	5.50E+01	--	mg/kg	North	122	100	7.67E-02 - 7.98E-02	5.50E+01	--	3.48E+00	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7439-89-6	Iron	8.94E+00	J	9.95E+01	--	mg/kg	North	122	100	4.43E+00 - 4.61E+00	9.95E+01	--	6.08E+01	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7439-92-1	Lead	3.96E-02	J	9.04E-01	--	mg/kg	North	122	100	2.49E-02 - 2.59E-02	9.04E-01	--	1.50E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	7439-95-4	Magnesium	3.60E+02	--	1.41E+03	--	mg/kg	South	S008	100	3.24E+00 - 3.37E+00	1.41E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hep + Muscle combined	7439-96-5	Manganese	1.10E+00	J	2.70E+01	--	mg/kg	North	N006	100	1.61E-01 - 1.67E-01	2.70E+01	--	1.22E+01	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7439-97-6	Mercury	4.75E-02	--	2.24E-01	--	mg/kg	North	N002	100	3.27E-04 - 1.97E-03	2.24E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	22967-92-6	Methyl Mercury	3.83E-02	--	2.67E-01	--	mg/kg	Central	126	100	5.00E-04 - 1.93E-03	2.67E-01	--	8.69E-03	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7440-02-0	Nickel	1.85E-01	U	5.92E-01	J	mg/kg	Central	C003	97	1.80E-01 - 1.87E-01	5.92E-01	J	1.74E+00	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	7440-09-7	Potassium	2.29E+03	--	5.91E+03	--	mg/kg	North	123	100	1.18E+01 - 1.22E+01	5.91E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hep + Muscle combined	7782-49-2	Selenium	6.57E-01	--	1.43E+00	--	mg/kg	Central	125	100	9.59E-02 - 9.97E-02	1.43E+00	--	4.35E-01	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7440-22-4	Silver	2.79E-01	--	1.60E+00	--	mg/kg	North	122	100	1.91E-02 - 1.99E-02	1.60E+00	--	4.35E-01	nc	--	Y	Max > screening val
	Crab	Hep + Muscle combined	7440-23-5	Sodium	2.05E+03	--	4.44E+03	--	mg/kg	North	122	100	1.08E+01 - 1.12E+01	4.44E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hep + Muscle combined	7440-28-0	Thallium	2.87E-02	U	2.99E-02	U	mg/kg	North	N006	0	2.87E-02 - 2.99E-02	2.99E-02	U	8.69E-04	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hep + Muscle combined	7440-32-6	Titanium	1.64E-01	U	7.19E-01	J	mg/kg	North	N002	72	1.63E-01 - 1.69E-01	7.19E-01	J	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Hep + Muscle combined	7440-62-2	Vanadium	2.95E-02	U	1.61E-01	--	mg/kg	North	N004	97	2.87E-02 - 2.99E-02	1.61E-01	--	4.38E-01	nc	--	N	Max ≤ screening val
	Crab	Hep + Muscle combined	7440-66-6	Zinc	2.96E+01	--	5.80E+01	--	mg/kg	North	N002	100	7.10E-01 - 7.38E-01	5.80E+01	--	2.61E+01	nc	--	Y	Max > screening val
	Dioxin-like Compounds																			
	Crab	Hepatopancreas	1746-01-6	2,3,7,8-TCDD	1.57E-05	--	1.65E-04	--	mg/kg	North	N005	100	3.01E-08 - 2.30E-07	1.65E-04	--	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	40321-76-4	1,2,3,7,8-PeCDD	5.47E-08	U	3.38E-06	J	mg/kg	North	132	78	5.47E-08 - 3.77E-07	3.38E-06	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	39227-28-6	1,2,3,4,7,8-HxCDD	2.86E-07	J	1.04E-06	J	mg/kg	North	N005	100	2.75E-08 - 1.29E-07	1.04E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	57653-85-7	1,2,3,6,7,8-HxCDD	1.16E-06	J	3.20E-06	J	mg/kg	North	N005	100	2.35E-08 - 1.33E-07	3.20E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	19408-74-3	1,2,3,7,8,9-HxCDD	3.50E-07	J	1.01E-06	J	mg/kg	Central	C008	100	2.73E-08 - 1.35E-07	1.01E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	35822-46-9	1,2,3,4,6,7,8-HpCDD	1.08E-06	J	3.25E-06	J	mg/kg	North	N005	100	1.49E-08 - 5.23E-08	3.25E-06	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	3268-87-9	OCDD	2.50E-06	J	2.04E-05	J	mg/kg	North	N008	100	1.16E-08 - 4.04E-08	2.04E-05	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	51207-31-9	2,3,7,8-TCDF	1.93E-05	J	5.87E-05	J	mg/kg	South	S009	100	8.44E-08 - 3.60E-07	5.87E-05	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	57117-41-6	1,2,3,7,8-PeCDF	3.60E-06	J	1.06E-05	J	mg/kg	North	N005	100	3.22E-08 - 2.24E-07	1.06E-05	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	57117-31-4	2,3,4,7,8-PeCDF	5.82E-06	J	2.42E-05	J	mg/kg	North	122	100	2.43E-08 - 1.88E-07	2.42E-05	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	70648-26-9	1,2,3,4,7,8-HxCDF	2.13E-06	J	3.05E-05	J	mg/kg	North	122	100	7.85E-09 - 1.14E-07	3.05E-05	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	57117-44-9	1,2,3,6,7,8-HxCDF	1.62E-06	J	8.32E-06	J	mg/kg	North	N005	100	1.79E-08 - 1.59E-07	8.32E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	72918-21-9	1,2,3,7,8,9-HxCDF	5.25E-08	J	3.12E-07	J	mg/kg	North	122	95	1.92E-08 - 1.64E-07	3.12E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	60851-34-5	2,3,4,6,7,8-HxCDF	5.61E-07	J	2.09E-06	J	mg/kg	North	122	100	1.83E-08 - 1.39E-07	2.09E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hepatopancreas	67562-39-4	1,2,3,4,6,7,8-HpCDF	3.39E-06	J	3.52E-05	J	mg/kg	North	N005	100	2.92E-08 - 1.69E-07	3.52E-05	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	55673-89-7	1,2,3,4,7,8,9-HpCDF	5.04E-08	J	3.68E-07	J	mg/kg	North	N005	38	3.72E-08 - 2.06E-07	3.68E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	39001-02-0	OCDF	1.89E-07	J	1.77E-06	J	mg/kg	North	N001	100	1.43E-08 - 6.50E-08	1.77E-06	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	–	KM TEQ DF	2.20E-05	–	1.83E-04	–	mg/kg	North	N005	100	-	1.83E-04	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	32598-13-3	PCB-77	2.41E-03	J	9.49E-03	J	mg/kg	Central	C002	100	1.36E-06 - 1.32E-05	9.49E-03	J	3.20E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	70362-50-4	PCB-81	1.34E-04	–	5.07E-04	–	mg/kg	North	N007	100	1.71E-06 - 1.70E-05	5.07E-04	–	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	32598-14-4	PCB-105	1.35E-02	J	5.57E-02	J	mg/kg	North	N007	100	1.62E-06 - 1.60E-05	5.57E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	74472-37-0	PCB-114	1.39E-03	J	4.96E-03	–	mg/kg	North	N007	100	1.43E-06 - 1.42E-05	4.96E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	31508-00-6	PCB-118	7.18E-02	J	2.48E-01	J	mg/kg	North	N007	100	2.86E-06 - 2.83E-05	2.48E-01	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	65510-44-3	PCB-123	1.40E-03	J	4.43E-03	–	mg/kg	North	N007	100	1.62E-06 - 1.60E-05	4.43E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	57465-28-8	PCB-126	1.56E-06	U	5.70E-04	–	mg/kg	North	N007	97	1.52E-06 - 1.51E-05	5.70E-04	–	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	–	PCB-156/157	6.00E-03	J	1.95E-02	J	mg/kg	Central	C002	100	2.19E-06 - 2.17E-05	1.95E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	52663-72-6	PCB-167	2.63E-03	J	8.18E-03	J	mg/kg	North	N007	100	1.24E-06 - 1.23E-05	8.18E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	32774-16-6	PCB-169	1.43E-06	U	2.07E-04	–	mg/kg	North	133	38	1.43E-06 - 1.42E-05	2.07E-04	–	1.07E-06	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	39635-31-9	PCB-189	4.14E-04	–	1.48E-03	–	mg/kg	Central, North	C002, N007	100	1.24E-06 - 1.23E-05	1.48E-03	–	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	–	KM TEQ PCB	4.94E-06	J	6.76E-05	–	mg/kg	North	N007	100	-	6.76E-05	–	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																			
	Crab	Hepatopancreas	–	Total Non-DL PCBs	5.59E-01	J	1.76E+00	J	mg/kg	North	N007	100	-	1.76E+00	J	2.08E-03	ca	–	Y	Max > screening val
	PAHs																			
	Crab	Hepatopancreas	90-12-0	1-Methylnaphthalene	2.60E-03	U	2.80E-02	J	mg/kg	North	N001	24	2.60E-03 - 1.30E-02	2.80E-02	J	1.43E-01	ca	–	N	Max ≤ screening val
	Crab	Hepatopancreas	91-57-6	2-Methylnaphthalene	2.60E-03	U	3.70E-02	J	mg/kg	North	N001	65	2.60E-03 - 1.30E-02	3.70E-02	J	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	83-32-9	Acenaphthene	2.60E-03	U	1.10E-01	J	mg/kg	North	N001	86	2.60E-03 - 1.30E-02	1.10E-01	J	5.21E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	208-96-8	Acenaphthylene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	30	2.60E-03 - 1.30E-02	1.30E-02	U	5.21E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	120-12-7	Anthracene	2.60E-03	J, U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	65	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	56-55-3	Benz(a)anthracene	2.60E-03	U, J	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	24	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hepatopancreas	50-32-8	Benzo(a)pyrene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hepatopancreas	205-99-2	Benzo(b)fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hepatopancreas	192-97-2	Benzo(e)pyrene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	191-24-2	Benzo(g,h,i)perylene	2.60E-03	U	1.90E-02	J	mg/kg	North	122	11	2.60E-03 - 1.30E-02	1.90E-02	J	2.61E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	Benzo(j,k)Fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	3.47E-03	ca	–	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Hepatopancreas	–	C1-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	–	C1-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	–	C1-Fluorenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	5	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C1-Naphthalenes	2.60E-03	U	6.00E-02	–	mg/kg	North	N001	57	2.60E-03 - 1.30E-02	6.00E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C1-Phenanthrenes/Anthracenes	2.60E-03	U	2.10E-02	–	mg/kg	Central	C007	11	2.60E-03 - 1.30E-02	2.10E-02	–	2.61E+01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C2-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	–	C2-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	–	C2-Fluorenes	2.60E-03	U	1.50E-01	–	mg/kg	Central	C008	8	2.60E-03 - 1.30E-02	1.50E-01	–	3.48E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C2-Naphthalenes	2.60E-03	U	4.80E-02	–	mg/kg	North	N001	30	2.60E-03 - 1.30E-02	4.80E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C2-Phenanthrenes/Anthracenes	2.60E-03	U	3.80E-02	–	mg/kg	Central	C008	8	2.60E-03 - 1.30E-02	3.80E-02	–	2.61E+01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C3-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	–	C3-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	–	C3-Fluorenes	2.60E-03	U	2.20E-02	–	mg/kg	North	N006	8	2.60E-03 - 1.30E-02	2.20E-02	–	3.48E+00	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C3-Naphthalenes	2.60E-03	U	1.40E-02	–	mg/kg	North	133	5	2.60E-03 - 1.30E-02	1.40E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C3-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	–	C4-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	–	C4-Naphthalenes	2.60E-03	U	1.40E-02	–	mg/kg	North	133	5	2.60E-03 - 1.30E-02	1.40E-02	–	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Hepatopancreas	–	C4-Phenanthrenes/anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	3	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	218-01-9	Chrysene	2.60E-03	U	1.40E-02	J	mg/kg	North	N001	38	2.60E-03 - 1.30E-02	1.40E-02	J	4.16E+00	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hepatopancreas	53-70-3	Dibenz(a,h)anthracene	2.60E-03	U, J	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hepatopancreas	206-44-0	Fluoranthene	2.60E-03	U	4.40E-02	J	mg/kg	North	N001	86	2.60E-03 - 1.30E-02	4.40E-02	J	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	86-73-7	Fluorene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	8	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	193-39-5	Indeno(1,2,3-c,d)-pyrene	2.60E-03	U	5.20E-01	J	mg/kg	North	122	5	2.60E-03 - 1.30E-02	5.20E-01	J	4.16E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Hepatopancreas	91-20-3	Naphthalene	2.60E-03	U	3.00E-02	J	mg/kg	North	N001	38	2.60E-03 - 1.30E-02	3.00E-02	J	1.74E+00	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	198-55-0	Perylene	2.60E-03	U	1.30E-02	U	mg/kg	South, North	130, N001, N008, S007	43	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	85-01-8	Phenanthrene	2.60E-03	U	2.40E-02	J	mg/kg	North	N001	57	2.60E-03 - 1.30E-02	2.40E-02	J	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	129-00-0	Pyrene	2.60E-03	U	4.00E-02	J	mg/kg	North	N001	89	2.60E-03 - 1.30E-02	4.00E-02	J	2.61E+00	nc	--	N	Max ≤ screening val
	Pesicides & Organics																			
	Crab	Hepatopancreas	122-66-7	1,2-Diphenylhydrazine	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	3	6.60E-02 - 6.50E-01	6.50E-01	U	5.20E-03	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Hepatopancreas	95-94-3	1,2,4,5-Tetrachlorobenzene	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	91-58-7	2-Chloronaphthalene	2.80E-02	U	2.70E-01	U	mg/kg	Central, South	C002, C005, S008	0	2.80E-02 - 2.70E-01	2.70E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	95-57-8	2-Chlorophenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	4.35E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	88-74-4	2-Nitroaniline	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	88-75-5	2-Nitrophenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	58-90-2	2,3,4,6-Tetrachlorophenol	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	120-83-2	2,4-Dichlorophenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	105-67-9	2,4-Dimethylphenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	51-28-5	2,4-Dinitrophenol	1.20E+00	U	1.20E+01	U	mg/kg	Central, South	C002, C005, S008	0	1.20E+00 - 1.20E+01	1.20E+01	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	121-14-2	2,4-Dinitrotoluene	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	95-95-4	2,4,5-Trichlorophenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	88-06-2	2,4,6-Trichlorophenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	53-19-0	2,4'-DDD	4.98E-06	U	3.13E-03	--	mg/kg	South	S001	97	4.98E-06 - 4.98E-06	3.13E-03	--	2.61E-03	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	3424-82-6	2,4'-DDE	9.95E-06	U	6.27E-03	--	mg/kg	South	130	97	9.95E-06 - 9.95E-06	6.27E-03	--	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	789-02-6	2,4'-DDT	1.08E-05	U	3.47E-03	--	mg/kg	South	S001	84	1.08E-05 - 1.08E-05	3.47E-03	--	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	606-20-2	2,6-Dinitrotoluene	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	99-09-2	3-Nitroaniline	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	91-94-1	3,3'-Dichlorobenzidine	3.90E-01	U	3.90E+00	U	mg/kg	Central, South	C002, C005, S008	0	3.90E-01 - 3.90E+00	3.90E+00	U	9.24E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	101-55-3	4-Bromophenyl phenyl ether	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Hepatopancreas	59-50-7	4-Chloro-3-Methylphenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	106-47-8	4-Chloroaniline	1.30E-01	U	1.30E+00	U	mg/kg	Central, South	C002, C005, S008	0	1.30E-01 - 1.30E+00	1.30E+00	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	7005-72-3	4-Chlorophenyl phenyl ether	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Hepatopancreas	106-44-5	4-Methylphenol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	3	6.60E-02 - 6.50E-01	6.50E-01	U	8.69E+00	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	100-01-6	4-Nitroaniline	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	100-02-7	4-Nitrophenol	6.60E-01	U	6.50E+00	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-01 - 6.50E+00	6.50E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	72-54-8	4,4'-DDD	2.04E-02	J	4.75E-01	J	mg/kg	South	134	100	7.35E-06 - 7.35E-06	4.75E-01	J	2.61E-03	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	72-55-9	4,4'-DDE	1.08E-01	J	6.70E-01	J	mg/kg	South	130	100	7.58E-06 - 7.58E-06	6.70E-01	J	1.22E-02	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	50-29-3	4,4'-DDT	2.34E-04	J	1.31E-02	J	mg/kg	South	S001	100	9.40E-06 - 9.40E-06	1.31E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	534-52-1	4,6-Dinitro-2-methylphenol	6.60E-01	U	6.50E+00	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-01 - 6.50E+00	6.50E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	98-86-2	Acetophenone	6.60E-02	U	1.20E+00	--	mg/kg	Central	C008	6	6.60E-02 - 6.50E-01	1.20E+00	--	8.69E+00	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	309-00-2	Aldrin	5.81E-06	J	1.61E-05	J	mg/kg	North	N007	14	9.16E-06 - 9.16E-06	1.61E-05	J	2.45E-04	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	319-84-6	Alpha-BHC	3.99E-05	--	1.41E-04	--	mg/kg	Central	C006	100	6.40E-06 - 6.40E-06	1.41E-04	--	6.60E-04	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	1912-24-9	Atrazine	1.30E-01	U	1.30E+00	U	mg/kg	Central, South	C002, C005, S008	0	1.30E-01 - 1.30E+00	1.30E+00	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	100-52-7	Benzaldehyde	3.60E-01	J	5.20E+00	--	mg/kg	North, South	N001, S004	69	2.60E-01 - 2.60E+00	5.20E+00	--	1.04E+00	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	92-87-5	Benzidine	2.80E+00	U	2.70E+01	U	mg/kg	Central, South	C002, C005, S008	0	2.80E+00 - 2.70E+01	2.70E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Crab	Hepatopancreas	65-85-0	Benzoic Acid	6.60E-01	U	1.20E+01	--	mg/kg	Central	124	44	6.60E-01 - 6.50E+00	1.20E+01	--	3.48E+02	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	319-85-7	Beta-BHC	1.11E-05	U	5.51E-04	--	mg/kg	North	N007	97	1.11E-05 - 1.11E-05	5.51E-04	--	2.31E-03	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	92-52-4	Biphenyl	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	5.20E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	108-60-1	Bis(2-chloro-1-methylethyl) ether	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	111-91-1	bis(2-Chloroethoxy)methane	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	111-44-4	bis(2-Chloroethyl)ether	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	3.78E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	117-81-7	bis(2-Ethylhexyl)phthalate	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	2.97E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	85-68-7	Butyl benzyl phthalate	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	2.19E+00	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	105-60-2	Caprolactam	1.30E-01	U	1.30E+00	U	mg/kg	Central, South	C002, C005, S008	0	1.30E-01 - 1.30E+00	1.30E+00	U	4.35E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	86-74-8	Carbazole	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	5103-71-9	Chlordane, alpha (cis)	8.83E-06	U	1.15E-02	--	mg/kg	North	N007	97	8.83E-06 - 8.83E-06	1.15E-02	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	5103-74-2	Chlordane, gamma (trans)	1.37E-05	U	1.61E-03	--	mg/kg	North	N007	94	1.37E-05 - 1.37E-05	1.61E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	319-86-8	Delta-BHC	5.08E-06	U	4.22E-05	--	mg/kg	South	134	9	5.08E-06 - 5.08E-06	4.22E-05	--	6.60E-04	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	84-74-2	Di-n-butyl phthalate	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	117-84-0	Di-n-octyl phthalate	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hepatopancreas	132-64-9	Dibenzofuran	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	1002-53-5	Dibutyltin	1.20E-03	U	1.80E-03	J	mg/kg	South	129	11	1.20E-03 - 1.30E-03	1.80E-03	J	2.61E-02	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	60-57-1	Dieldrin	4.55E-03	--	3.40E-02	J	mg/kg	Central	C007	100	1.54E-05 - 1.54E-05	3.40E-02	J	2.60E-04	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	84-66-2	Diethyl phthalate	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	131-11-3	Dimethyl phthalate	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	0	2.60E-01 - 2.60E+00	2.60E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	959-98-8	Endosulfan I	2.50E-05	J	5.74E-05	U	mg/kg	North, Central, South	122, 124, 125, 126, 127, 129, 131, 133, C001, C003, C004, C005, C007, C008, N001, N002, S001, S002, S003, S004, S006, S007	4	5.74E-05 - 5.74E-05	5.74E-05	U	5.21E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	5.83E-05 - 5.83E-05	5.83E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	1031-07-8	Endosulfan Sulfate	6.05E-05	J	6.33E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 131, 132, 134, C001, C002, C003, C004, C006, C007, C008, N002, N003, N004, N005, N006, N007, N008, S001, S002, S004, S005, S006, S007, S008, S009	3	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	72-20-8	Endrin	1.39E-05	U	1.39E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	1.39E-05 - 1.39E-05	1.39E-05	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	7421-93-4	Endrin Aldehyde	1.31E-04	U	2.28E-04	J	mg/kg	South	130	21	1.31E-04 - 1.31E-04	2.28E-04	J	2.61E-02	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	53494-70-5	Endrin Ketone	7.60E-05	U	7.60E-05	U	mg/kg	North, Central, South	122, 125, 126, 127, 129, C001, C003, C004, C006, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007	0	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	58-89-9	Gamma-BHC (Lindane)	7.69E-06	U	5.70E-05	--	mg/kg	North	N007	81	7.69E-06 - 7.69E-06	5.70E-05	--	3.78E-03	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	76-44-8	Heptachlor	1.58E-06	J	3.25E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, S001, S002, S003, S004, S005, S006, S007, S008, S009	5	3.25E-05 - 3.25E-05	3.25E-05	U	9.24E-04	ca	--	N	Max ≤ screening val
	Crab	Hepatopancreas	1024-57-3	Heptachlor epoxide, cis-	5.10E-03	--	3.88E-02	J	mg/kg	North	N007	100	7.00E-06 - 7.00E-06	3.88E-02	J	4.57E-04	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	28044-83-9	Heptachlor epoxide, trans-	1.13E-03	--	8.76E-03	--	mg/kg	North	N007	100	1.70E-05 - 1.70E-05	8.76E-03	--	4.57E-04	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	118-74-1	Hexachlorobenzene	1.39E-03	J	8.58E-03	J	mg/kg	North	N007	100	4.06E-06 - 4.06E-06	8.58E-03	J	2.60E-03	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	87-68-3	Hexachlorobutadiene	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	5.33E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	77-47-4	Hexachlorocyclopentadiene	6.60E-01	U	6.50E+00	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-01 - 6.50E+00	6.50E+00	U	5.21E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	67-72-1	Hexachloroethane	1.30E-01	U	1.30E+00	U	mg/kg	Central, South	C002, C005, S008	0	1.30E-01 - 1.30E+00	1.30E+00	U	6.08E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hepatopancreas	78-59-1	Isophorone	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	4.38E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	72-43-5	Methoxychlor	1.39E-05	J	3.89E-05	U	mg/kg	North, Central, South	122, 124, 125, 126, 127, 129, 130, 131, C001, C003, C004, C006, C007, C008, N001, N002, N004, N008, S001, S002, S003, S004, S005, S006, S007, S008	4	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Hepatopancreas	2385-85-5	Mirex	3.24E-04	J	1.16E-03	J	mg/kg	North	N007	100	9.33E-06 - 9.33E-06	1.16E-03	J	2.31E-04	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	2406-65-7	Monobutyltin	2.00E-02	U	2.10E-02	U	mg/kg	North, Central, South	123, 124, 132, C003, C005, N004, N006, N007, S004, S007, S008, S009	0	2.00E-02 - 2.10E-02	2.10E-02	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	621-64-7	N-Nitroso-di-n-propylamine	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	5.94E-04	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	86-30-6	N-Nitrosodiphenylamine	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	8.49E-01	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	98-95-3	Nitrobenzene	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	5103-73-1	Nonachlor, cis-	8.98E-03	--	4.09E-02	J	mg/kg	North	N007	100	1.26E-05 - 1.26E-05	4.09E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	39765-80-5	Nonachlor, trans-	5.56E-03	J	8.54E-02	J	mg/kg	North	N007	100	1.04E-05 - 1.04E-05	8.54E-02	J	1.19E-02	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	95-48-7	o-Cresol	6.60E-02	U	6.50E-01	U	mg/kg	Central, South	C002, C005, S008	0	6.60E-02 - 6.50E-01	6.50E-01	U	4.35E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	27304-13-8	Oxychlordane	2.00E-02	J	1.24E-01	J	mg/kg	North	N007	100	1.00E-05 - 1.00E-05	1.24E-01	J	1.19E-02	ca	--	Y	Max > screening val
	Crab	Hepatopancreas	87-86-5	Pentachlorophenol	1.30E-01	U	1.30E+00	U	mg/kg	Central, South	C002, C005, S008	0	1.30E-01 - 1.30E+00	1.30E+00	U	1.04E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	108-95-2	Phenol	6.60E-02	U	6.70E-01	J	mg/kg	South	S008	19	6.60E-02 - 6.50E-01	6.70E-01	J	2.61E+01	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	110-86-1	Pyridine	2.60E-01	U	2.60E+00	U	mg/kg	Central, South	C002, C005, S008	17	2.60E-01 - 2.60E+00	2.60E+00	U	8.69E-02	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	1461-25-2	Tetrabutyltin	1.60E-03	U	1.70E-03	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 130, 131, 132, 133, C002, C003, C004, C005, C006, C008, N002, N004, N005, N006, N007, S001, S003, S004, S005, S007, S008, S009	0	1.60E-03 - 1.70E-03	1.70E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	688-73-3	Tributyltin	1.40E-03	U	1.50E-03	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, C002, C003, C004, C005, C006, C008, N002, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S007, S008, S009	0	1.40E-03 - 1.50E-03	1.50E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Inorganics																			
	Crab	Hepatopancreas	7429-90-5	Aluminum	5.38E+00	U	9.16E+01	--	mg/kg	North	122	46	5.33E+00 - 5.60E+00	9.16E+01	--	8.69E+01	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7440-36-0	Antimony	6.29E-02	U	6.60E-02	U	mg/kg	Central, North, South	124, 125, 127, C004, C007, N003, S006	0	6.29E-02 - 6.60E-02	6.60E-02	U	3.48E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	7440-38-2	Arsenic, organic	6.93E-01	--	5.54E+00	--	mg/kg	South	S009	100	1.29E-01 - 1.35E-01	5.54E+00	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	7440-38-2	Arsenic, inorganic	7.70E-02	--	6.16E-01	--	mg/kg	South	S009	100	1.43E-02 - 1.50E-02	6.16E-01	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	7440-39-3	Barium	1.77E-01	U	6.40E+00	--	mg/kg	Central	C001	95	1.75E-01 - 1.84E-01	6.40E+00	--	1.74E+01	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	7440-41-7	Beryllium	1.35E-02	U	1.42E-02	U	mg/kg	Central, North, South	124, 125, 127, C004, C007, N003, S006	0	1.35E-02 - 1.42E-02	1.42E-02	U	1.74E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Hepatopancreas	7440-43-9	Cadmium	4.55E-02	U	2.99E+00	--	mg/kg	Central	127	97	4.38E-02 - 4.60E-02	2.99E+00	--	8.69E-02	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7440-70-2	Calcium	2.41E+03	--	7.12E+04	--	mg/kg	North	N002	100	1.77E+01 - 4.47E+01	7.12E+04	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hepatopancreas	7440-47-3	Chromium [as Cr(III)]	9.62E-02	U	7.36E-01	--	mg/kg	Central	C003	70	9.52E-02 - 1.00E-01	7.36E-01	--	8.32E-03	ca	Carc	Y	Known human carcinogen
	Crab	Hepatopancreas	7440-48-4	Cobalt	1.26E-01	--	3.71E-01	--	mg/kg	South	130	100	1.90E-02 - 2.00E-02	3.71E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7440-50-8	Copper	3.55E+00	--	1.27E+02	--	mg/kg	South	S008	100	7.62E-02 - 8.00E-02	1.27E+02	--	3.48E+00	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7439-89-6	Iron	2.16E+01	--	2.77E+02	--	mg/kg	North	122	100	4.40E+00 - 4.62E+00	2.77E+02	--	6.08E+01	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7439-92-1	Lead	2.57E-02	U	2.52E+00	--	mg/kg	North	122	97	2.48E-02 - 2.60E-02	2.52E+00	--	1.50E+00	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7439-95-4	Magnesium	3.62E+02	--	2.02E+03	--	mg/kg	Central	127	100	3.22E+00 - 3.38E+00	2.02E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hepatopancreas	7439-96-5	Manganese	1.62E-01	U	5.28E+01	--	mg/kg	North	N002	97	1.60E-01 - 1.68E-01	5.28E+01	--	1.22E+01	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7439-97-6	Mercury	3.12E-02	--	1.34E-01	--	mg/kg	Central	126	100	8.50E-05 - 2.14E-03	1.34E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	22967-92-6	Methyl Mercury	1.20E-02	--	1.13E-01	--	mg/kg	North	N008	100	5.00E-04 - 2.00E-03	1.13E-01	--	8.69E-03	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7440-02-0	Nickel	1.88E-01	U	1.20E+00	--	mg/kg	Central	C003	97	1.79E-01 - 1.88E-01	1.20E+00	--	1.74E+00	nc	--	N	Max ≤ screening val
	Crab	Hepatopancreas	7440-09-7	Potassium	1.76E+03	--	4.69E+03	--	mg/kg	South	S009	100	1.17E+01 - 1.22E+01	4.69E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hepatopancreas	7782-49-2	Selenium	7.10E-01	--	2.58E+00	--	mg/kg	South	130	100	9.52E-02 - 1.00E-01	2.58E+00	--	4.35E-01	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7440-22-4	Silver	6.86E-02	J	3.87E+00	--	mg/kg	Central	125	100	1.90E-02 - 2.00E-02	3.87E+00	--	4.35E-01	nc	--	Y	Max > screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Hepatopancreas	7440-23-5	Sodium	1.64E+03	--	6.25E+03	--	mg/kg	North	132	100	1.07E+01 - 1.12E+01	6.25E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Hepatopancreas	7440-28-0	Thallium	2.86E-02	U	3.00E-02	U	mg/kg	Central, North, South	124, 125, 127, C004, C007, N003, S006	0	2.86E-02 - 3.00E-02	3.00E-02	U	8.69E-04	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Hepatopancreas	7440-32-6	Titanium	1.63E-01	U	2.30E+00	--	mg/kg	North	N002	73	1.62E-01 - 1.70E-01	2.30E+00	--	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Hepatopancreas	7440-62-2	Vanadium	2.91E-02	U	4.49E-01	--	mg/kg	North	N001	97	2.86E-02 - 3.00E-02	4.49E-01	--	4.38E-01	nc	--	Y	Max > screening val
	Crab	Hepatopancreas	7440-66-6	Zinc	2.26E+01	--	8.24E+01	--	mg/kg	South	S008	100	7.05E-01 - 7.40E-01	8.24E+01	--	2.61E+01	nc	--	Y	Max > screening val
	Dioxin-like Compounds																			
	Crab	Muscle	1746-01-6	2,3,7,8-TCDD	8.41E-07	J	8.53E-06	--	mg/kg	North	123	100	7.34E-09 - 8.31E-08	8.53E-06	--	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	40321-76-4	1,2,3,7,8-PeCDD	2.81E-08	U	5.32E-07	J	mg/kg	South	134	81	1.80E-08 - 7.33E-08	5.32E-07	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	39227-28-6	1,2,3,4,7,8-HxCDD	3.59E-09	U	4.64E-08	J	mg/kg	North	N006	65	3.59E-09 - 3.21E-08	4.64E-08	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	57653-85-7	1,2,3,6,7,8-HxCDD	1.90E-08	J	1.39E-07	J	mg/kg	North, South	122, 134	89	3.56E-09 - 3.15E-08	1.39E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	19408-74-3	1,2,3,7,8,9-HxCDD	3.22E-09	U	6.50E-08	J	mg/kg	North	N008	73	3.22E-09 - 3.12E-08	6.50E-08	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	35822-46-9	1,2,3,4,6,7,8-HpCDD	3.26E-08	J	2.39E-07	J	mg/kg	South	134	100	2.94E-09 - 3.03E-08	2.39E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	3268-87-9	OCDD	2.03E-07	J	8.69E-07	J	mg/kg	North	N008	100	5.34E-09 - 3.56E-08	8.69E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	51207-31-9	2,3,7,8-TCDF	3.12E-07	J	2.30E-06	J	mg/kg	North	123	100	9.12E-09 - 1.36E-07	2.30E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	57117-41-6	1,2,3,7,8-PeCDF	1.00E-07	J	5.14E-07	J	mg/kg	North	123	100	5.11E-09 - 3.48E-08	5.14E-07	J	1.07E-06	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	57117-31-4	2,3,4,7,8-PeCDF	3.07E-08	U	9.76E-07	J	mg/kg	North	123	97	4.38E-09 - 3.07E-08	9.76E-07	J	1.07E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	70648-26-9	1,2,3,4,7,8-HxCDF	1.12E-07	J	1.26E-06	J	mg/kg	North	123	100	2.99E-09 - 2.82E-08	1.26E-06	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	57117-44-9	1,2,3,6,7,8-HxCDF	3.00E-08	J	3.34E-07	J	mg/kg	North	123	100	2.86E-09 - 2.74E-08	3.34E-07	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	72918-21-9	1,2,3,7,8,9-HxCDF	2.29E-08	J	9.47E-08	J	mg/kg	Central	C003	100	3.36E-09 - 3.16E-08	9.47E-08	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	60851-34-5	2,3,4,6,7,8-HxCDF	5.05E-09	J	8.58E-08	J	mg/kg	North	133	95	3.03E-09 - 2.63E-08	8.58E-08	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	67562-39-4	1,2,3,4,6,7,8-HpCDF	6.64E-08	J	8.81E-07	J	mg/kg	North	133	100	5.28E-09 - 2.36E-08	8.81E-07	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	55673-89-7	1,2,3,4,7,8,9-HpCDF	6.17E-09	U	6.08E-08	J	mg/kg	North	N005	73	6.17E-09 - 3.04E-08	6.08E-08	J	3.20E-06	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	39001-02-0	OCDF	2.34E-08	J	1.73E-07	J	mg/kg	North	122	97	2.49E-09 - 3.95E-08	1.73E-07	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	--	KM TEQ DF	9.43E-07	J	9.63E-06	--	mg/kg	North	123	100	-	9.63E-06	--	3.20E-08	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	32598-13-3	PCB-77	3.18E-05	--	3.60E-04	--	mg/kg	North	N007	100	1.34E-06 - 1.06E-05	3.60E-04	--	3.20E-04	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	70362-50-4	PCB-81	1.73E-06	U	1.54E-05	J	mg/kg	South	134	97	1.71E-06 - 1.36E-05	1.54E-05	J	1.07E-04	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	32598-14-4	PCB-105	1.63E-04	--	3.20E-03	J	mg/kg	South	134	100	1.62E-06 - 1.29E-05	3.20E-03	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	74472-37-0	PCB-114	1.43E-06	U	2.81E-04	--	mg/kg	South	134	97	1.43E-06 - 1.14E-05	2.81E-04	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	31508-00-6	PCB-118	5.69E-04	J	1.23E-02	J	mg/kg	South	134	100	2.86E-06 - 2.27E-05	1.23E-02	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	65510-44-3	PCB-123	1.10E-05	--	2.21E-04	--	mg/kg	South	134	100	1.62E-06 - 1.29E-05	2.21E-04	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	57465-28-8	PCB-126	1.54E-06	U	2.26E-05	J	mg/kg	South	134	86	1.52E-06 - 1.21E-05	2.26E-05	J	3.20E-07	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	--	PCB-156/157	4.18E-05	--	1.31E-03	--	mg/kg	South	134	100	2.19E-06 - 1.74E-05	1.31E-03	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	52663-72-6	PCB-167	1.58E-05	--	4.54E-04	--	mg/kg	South	134	100	1.24E-06 - 9.85E-06	4.54E-04	--	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	32774-16-6	PCB-169	1.43E-06	U	1.14E-05	U	mg/kg	South	134	0	1.43E-06 - 1.14E-05	1.14E-05	U	1.07E-06	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	39635-31-9	PCB-189	1.25E-06	U	4.58E-05	J	mg/kg	South	134	92	1.24E-06 - 9.85E-06	4.58E-05	J	1.07E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	--	KM TEQ PCB	8.03E-08	J	2.85E-06	J	mg/kg	South	134	100	-	2.85E-06	J	3.20E-08	ca	Carc	Y	Known human carcinogen
	Non-DL PCBs																			
	Crab	Muscle	--	Total Non-DL PCBs	5.19E-03	J	5.73E-02	J	mg/kg	South	134	100	-	5.73E-02	J	2.08E-03	ca	--	Y	Max > screening val
	PAHs																			
	Crab	Muscle	90-12-0	1-Methylnaphthalene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	3	2.60E-03 - 1.30E-02	1.30E-02	U	1.43E-01	ca	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Muscle	91-57-6	2-Methylnaphthalene	2.60E-03	U	2.40E-02	J	mg/kg	Central	126	8	2.60E-03 - 1.30E-02	2.40E-02	J	3.48E-01	nc	--	N	Max ≤ screening val
	Crab	Muscle	83-32-9	Acenaphthene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	16	2.60E-03 - 1.30E-02	1.30E-02	U	5.21E+00	nc	--	N	Max ≤ screening val
	Crab	Muscle	208-96-8	Acenaphthylene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	5.21E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	120-12-7	Anthracene	2.60E-03	U	1.70E-01	--	mg/kg	Central	126	3	2.60E-03 - 1.30E-02	1.70E-01	--	2.61E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Muscle	56-55-3	Benz(a)anthracene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Muscle	50-32-8	Benzo(a)pyrene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Muscle	205-99-2	Benzo(b)fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	--	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Muscle	192-97-2	Benzo(e)pyrene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	191-24-2	Benzo(g,h,i)perylene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	–	Benzo(j,k)Fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	3.47E-03	ca	–	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	–	C1-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C1-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C1-Fluorenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C1-Naphthalenes	2.60E-03	U	2.00E-02	J	mg/kg	Central	126	11	2.60E-03 - 1.30E-02	2.00E-02	J	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Muscle	–	C1-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C2-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C2-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C2-Fluorenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C2-Naphthalenes	2.60E-03	U	1.60E-02	J	mg/kg	Central	126	14	2.60E-03 - 1.30E-02	1.60E-02	J	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Muscle	–	C2-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C3-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C3-Fluoranthenes/Pyrenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C3-Fluorenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C3-Naphthalenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	8	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E-01	nc	–	N	Max ≤ screening val
	Crab	Muscle	–	C3-Phenanthrenes/Anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C4-Chrysenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C4-Naphthalenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E-01	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	–	C4-Phenanthrenes/anthracenes	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+01	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	218-01-9	Chrysene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E+00	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Muscle	53-70-3	Dibenz(a,h)anthracene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-03	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Muscle	206-44-0	Fluoranthene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	3.48E+00	nc	–	N	Not detected, max DL ≤ screening val
	Crab	Muscle	86-73-7	Fluorene	2.60E-03	U	4.50E-01	–	mg/kg	Central	126	3	2.60E-03 - 1.30E-02	4.50E-01	–	3.48E+00	nc	–	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Muscle	193-39-5	Indeno(1,2,3-c,d)-pyrene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	4.16E-02	ca	–	Y	All 7 cPAHs retained since at least 1 is a COPC
	Crab	Muscle	91-20-3	Naphthalene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	5	2.60E-03 - 1.30E-02	1.30E-02	U	1.74E+00	nc	–	N	Max ≤ screening val
	Crab	Muscle	198-55-0	Perylene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	–	N	Not detected, max DL ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	85-01-8	Phenanthrene	2.60E-03	U	5.80E-02	--	mg/kg	Central	126	3	2.60E-03 - 1.30E-02	5.80E-02	--	2.61E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Muscle	129-00-0	Pyrene	2.60E-03	U	1.30E-02	U	mg/kg	Central, South	124, 126, S002, S003, S005, S007, S008, S009	0	2.60E-03 - 1.30E-02	1.30E-02	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Pesticides & Organics																			
	Crab	Muscle	122-66-7	1,2-Diphenylhydrazine	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.20E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	95-94-3	1,2,4,5-Tetrachlorobenzene	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	91-58-7	2-Chloronaphthalene	2.70E-02	U	1.40E-01	U	mg/kg	Central, North, South	125, C008, N002, S004	0	2.70E-02 - 1.40E-01	1.40E-01	U	6.95E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	95-57-8	2-Chlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	4.35E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	88-74-4	2-Nitroaniline	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	88-75-5	2-Nitrophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	58-90-2	2,3,4,6-Tetrachlorophenol	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.61E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	120-83-2	2,4-Dichlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	105-67-9	2,4-Dimethylphenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	1.74E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	51-28-5	2,4-Dinitrophenol	1.20E+00	U	6.00E+00	U	mg/kg	Central, North, South	C004, C008, N008, S003, S006, S007	0	1.20E+00 - 6.00E+00	6.00E+00	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	121-14-2	2,4-Dinitrotoluene	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01 - 1.30E+00	1.30E+00	U	1.34E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	95-95-4	2,4,5-Trichlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	88-06-2	2,4,6-Trichlorophenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	53-19-0	2,4'-DDD	3.99E-06	J	1.05E-04	--	mg/kg	South	S001	59	4.98E-06 - 4.98E-06	1.05E-04	--	2.61E-03	nc	--	N	Max ≤ screening val
	Crab	Muscle	3424-82-6	2,4'-DDE	7.76E-06	J	1.23E-04	--	mg/kg	South	130	92	9.95E-06 - 9.95E-06	1.23E-04	--	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Muscle	789-02-6	2,4'-DDT	7.17E-06	J	1.74E-04	--	mg/kg	South	S001	38	1.08E-05 - 1.08E-05	1.74E-04	--	1.22E-02	ca	--	N	Max ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	606-20-2	2,6-Dinitrotoluene	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.77E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	99-09-2	3-Nitroaniline	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01 - 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	91-94-1	3,3'-Dichlorobenzidine	3.90E-01	U	2.00E+00	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	3	3.90E-01 - 2.00E+00	2.00E+00	U	9.24E-03	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Muscle	101-55-3	4-Bromophenyl phenyl ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Muscle	59-50-7	4-Chloro-3-Methylphenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	106-47-8	4-Chloroaniline	1.30E-01	U	6.70E-01	U	mg/kg	Central, North, South	C004, N008, S006	0	1.30E-01 - 6.70E-01	6.70E-01	U	2.08E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	7005-72-3	4-Chlorophenyl phenyl ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Muscle	106-44-5	4-Methylphenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	100-01-6	4-Nitroaniline	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.08E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	100-02-7	4-Nitrophenol	6.50E-01	U	3.30E+00	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-01 - 3.30E+00	3.30E+00	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	72-54-8	4,4'-DDD	1.04E-03	--	1.43E-02	J	mg/kg	South	134	100	7.35E-06 - 7.35E-06	1.43E-02	J	2.61E-03	nc	--	Y	Max > screening val
	Crab	Muscle	72-55-9	4,4'-DDE	4.58E-03	J	3.31E-02	J	mg/kg	South	S002	100	7.58E-06 - 7.58E-06	3.31E-02	J	1.22E-02	ca	--	Y	Max > screening val
	Crab	Muscle	50-29-3	4,4'-DDT	9.40E-06	U	3.54E-04	J	mg/kg	South	S001	94	9.40E-06 - 9.40E-06	3.54E-04	J	1.22E-02	ca	--	N	Max ≤ screening val
	Crab	Muscle	534-52-1	4,6-Dinitro-2-methylphenol	6.50E-01	U	3.30E+00	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-01 - 3.30E+00	3.30E+00	U	6.95E-03	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	98-86-2	Acetophenone	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	309-00-2	Aldrin	9.16E-06	U	9.16E-06	U	mg/kg	North, Central, South	122, 123, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S007, S008	0	9.16E-06 - 9.16E-06	9.16E-06	U	2.45E-04	ca	--	N	Not detected, max DL ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	319-84-6	Alpha-BHC	4.60E-06	J	1.16E-05	J	mg/kg	Central	127	78	6.40E-06 - 6.40E-06	1.16E-05	J	6.60E-04	ca	--	N	Max ≤ screening val
	Crab	Muscle	1912-24-9	Atrazine	1.30E-01	U	6.70E-01	U	mg/kg	Central, North, South	C004, N008, S006	0	1.30E-01 - 6.70E-01	6.70E-01	U	1.81E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	100-52-7	Benzaldehyde	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	3	2.60E-01 - 1.30E+00	1.30E+00	U	1.04E+00	ca	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Muscle	92-87-5	Benzidine	2.70E+00	U	1.40E+01	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.70E+00 - 1.40E+01	1.40E+01	U	1.81E-05	ca	Carc	UNC	Known human carcinogen but not detected; eval uncertainty
	Crab	Muscle	65-85-0	Benzoic Acid	6.50E-01	U	3.30E+00	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-01 - 3.30E+00	3.30E+00	U	3.48E+02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	319-85-7	Beta-BHC	7.75E-06	J	2.40E-05	J	mg/kg	North	N004	43	1.11E-05 - 1.11E-05	2.40E-05	J	2.31E-03	ca	--	N	Max ≤ screening val
	Crab	Muscle	92-52-4	Biphenyl	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.20E-01	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	108-60-1	Bis(2-chloro-1-methylethyl) ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	111-91-1	bis(2-Chloroethoxy)methane	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	111-44-4	bis(2-Chloroethyl)ether	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	3.78E-03	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	117-81-7	bis(2-Ethylhexyl)phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.97E-01	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	85-68-7	Butyl benzyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01 - 1.30E+00	1.30E+00	U	2.19E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	105-60-2	Caprolactam	1.30E-01	U	6.70E-01	U	mg/kg	Central, North, South	C004, N008, S006	0	1.30E-01 - 6.70E-01	6.70E-01	U	4.35E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	86-74-8	Carbazole	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	3.48E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	5103-71-9	Chlordane, alpha (cis)	8.83E-06	U	1.59E-03	--	mg/kg	Central	127	97	8.83E-06 - 8.83E-06	1.59E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Muscle	5103-74-2	Chlordane, gamma (trans)	1.37E-05	U	6.22E-05	--	mg/kg	Central	127	34	1.37E-05 - 1.37E-05	6.22E-05	--	1.19E-02	ca	--	N	Max ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits		Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																					
	Crab	Muscle	319-86-8	Delta-BHC	5.08E-06	U	5.08E-06	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	5.08E-06	- 5.08E-06	5.08E-06	U	6.60E-04	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	84-74-2	Di-n-butyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01	- 1.30E+00	1.30E+00	U	8.69E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	117-84-0	Di-n-octyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01	- 1.30E+00	1.30E+00	U	8.69E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	132-64-9	Dibenzofuran	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02	- 3.30E-01	3.30E-01	U	8.69E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	1002-53-5	Dibutyltin	1.20E-03	U	1.60E-03	U	mg/kg	North	133	0	1.20E-03	- 1.60E-03	1.60E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	60-57-1	Dieldrin	3.07E-04	--	2.66E-03	--	mg/kg	North	123	100	1.54E-05	- 1.54E-05	2.66E-03	--	2.60E-04	ca	--	Y	Max > screening val
	Crab	Muscle	84-66-2	Diethyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01	- 1.30E+00	1.30E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	131-11-3	Dimethyl phthalate	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	0	2.60E-01	- 1.30E+00	1.30E+00	U	6.95E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	959-98-8	Endosulfan I	5.74E-05	U	5.74E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S006, S007, S008, S009	0	5.74E-05	- 5.74E-05	5.74E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	33213-65-9	Endosulfan II	5.83E-05	U	5.83E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	5.83E-05	- 5.83E-05	5.83E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	1031-07-8	Endosulfan Sulfate	6.33E-05	U	6.33E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 131, 132, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N005, N006, N008, S001, S002, S003, S004, S006, S007, S008, S009	0	6.33E-05 - 6.33E-05	6.33E-05	U	5.21E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	72-20-8	Endrin	1.39E-05	U	1.39E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	1.39E-05 - 1.39E-05	1.39E-05	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	7421-93-4	Endrin Aldehyde	1.31E-04	U	1.31E-04	U	mg/kg	North, Central, South	122, 123, 124, 125, 127, 129, 134, C001, C003, C006, C008, N001, N002, N003, N008, S001, S002, S003, S004, S006, S007, S008, S009	0	1.31E-04 - 1.31E-04	1.31E-04	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	53494-70-5	Endrin Ketone	7.60E-05	U	7.60E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 131, 132, 134, C001, C003, C005, C006, C007, C008, N001, N002, N003, N008, S001, S002, S003, S004, S006, S007, S008, S009	0	7.60E-05 - 7.60E-05	7.60E-05	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	58-89-9	Gamma-BHC (Lindane)	2.69E-06	J	7.69E-06	U	mg/kg	North, Central, South	122, 124, 126, 129, 130, 131, 132, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007	19	7.69E-06 - 7.69E-06	7.69E-06	U	3.78E-03	ca	--	N	Max ≤ screening val
	Crab	Muscle	76-44-8	Heptachlor	3.25E-05	U	3.25E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 133, 134, C001, C002, C003, C004, C005, C006, C007, C008, N001, N002, N003, N004, N005, N006, N007, N008, S001, S002, S003, S004, S005, S006, S007, S008, S009	0	3.25E-05 - 3.25E-05	3.25E-05	U	9.24E-04	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	1024-57-3	Heptachlor epoxide, cis-	6.09E-05	--	6.40E-04	--	mg/kg	North	N004	100	7.00E-06 - 7.00E-06	6.40E-04	--	4.57E-04	ca	--	Y	Max > screening val
	Crab	Muscle	28044-83-9	Heptachlor epoxide, trans-	1.70E-05	U	4.80E-04	--	mg/kg	North	123	84	1.70E-05 - 1.70E-05	4.80E-04	--	4.57E-04	ca	--	Y	Max > screening val
	Crab	Muscle	118-74-1	Hexachlorobenzene	7.65E-05	J	4.12E-04	J	mg/kg	South	130	100	4.06E-06 - 4.06E-06	4.12E-04	J	2.60E-03	ca	--	N	Max ≤ screening val
	Crab	Muscle	87-68-3	Hexachlorobutadiene	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.33E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	77-47-4	Hexachlorocyclopentadiene	6.50E-01	U	3.30E+00	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-01 - 3.30E+00	3.30E+00	U	5.21E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	67-72-1	Hexachloroethane	1.30E-01	U	6.70E-01	U	mg/kg	Central, North, South	C004, N008, S006	0	1.30E-01 - 6.70E-01	6.70E-01	U	6.08E-02	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	78-59-1	Isophorone	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	4.38E+00	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	72-43-5	Methoxychlor	8.78E-06	J	3.89E-05	U	mg/kg	North, Central, South	122, 123, 124, 125, 126, 127, 129, 130, 131, 132, 134, C001, C003, C004, C005, C006, C007, C008, N001, N002, N003, N008, S001, S002, S003, S004, S006, S007, S008, S009	3	3.89E-05 - 3.89E-05	3.89E-05	U	4.35E-01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Muscle	2385-85-5	Mirex	9.33E-06	U	1.19E-04	--	mg/kg	Central	127	91	9.33E-06 - 9.33E-06	1.19E-04	--	2.31E-04	ca	--	N	Max ≤ screening val
	Crab	Muscle	2406-65-7	Monobutyltin	2.00E-02	U	2.50E-02	U	mg/kg	North	133	0	2.00E-02 - 2.50E-02	2.50E-02	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	621-64-7	N-Nitroso-di-n-propylamine	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	5.94E-04	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	86-30-6	N-Nitrosodiphenylamine	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	8.49E-01	ca	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	98-95-3	Nitrobenzene	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	1.74E-01	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	5103-73-1	Nonachlor, cis-	1.79E-04	--	1.17E-03	--	mg/kg	North	123	100	1.26E-05 - 1.26E-05	1.17E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Muscle	39765-80-5	Nonachlor, trans-	1.04E-05	U	2.38E-03	--	mg/kg	North	123	81	1.04E-05 - 1.04E-05	2.38E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Muscle	95-48-7	o-Cresol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	4.35E+00	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	27304-13-8	Oxychlordane	5.49E-04	--	3.63E-03	--	mg/kg	Central	127	100	1.00E-05 - 1.00E-05	3.63E-03	--	1.19E-02	ca	--	N	Max ≤ screening val
	Crab	Muscle	87-86-5	Pentachlorophenol	1.30E-01	U	6.70E-01	U	mg/kg	Central, North, South	C004, N008, S006	0	1.30E-01 - 6.70E-01	6.70E-01	U	1.04E-02	ca	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	108-95-2	Phenol	6.50E-02	U	3.30E-01	U	mg/kg	Central, South, North	124, 125, 130, C004, C007, C008, N002, N008, S002, S003, S005, S006, S007, S008	0	6.50E-02 - 3.30E-01	3.30E-01	U	2.61E+01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	110-86-1	Pyridine	2.60E-01	U	1.30E+00	U	mg/kg	Central, South, North	124, 125, 126, 130, C004, C007, C008, N002, N008, S002, S003, S004, S005, S006, S007, S008, S009	8	2.60E-01 - 1.30E+00	1.30E+00	U	8.69E-02	nc	--	Y	Max > screening val
	Crab	Muscle	1461-25-2	Tetrabutyltin	1.60E-03	U	2.00E-03	U	mg/kg	North	133	0	1.60E-03 - 2.00E-03	2.00E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	688-73-3	Tributyltin	1.40E-03	U	1.80E-03	U	mg/kg	North	133	0	1.40E-03 - 1.80E-03	1.80E-03	U	2.61E-02	nc	--	N	Not detected, max DL ≤ screening val
	Inorganics																			
	Crab	Muscle	7429-90-5	Aluminum	5.33E+00	U	5.60E+00	U	mg/kg	South, North	131, 132, N006, N007	3	5.33E+00 - 5.60E+00	5.60E+00	U	8.69E+01	nc	--	N	Detected in ≤5% of samples, max ≤ screening val
	Crab	Muscle	7440-36-0	Antimony	6.29E-02	U	2.86E-01	--	mg/kg	North	N004	3	6.29E-02 - 6.60E-02	2.86E-01	--	3.48E-02	nc	--	UNC	Detected in ≤5% of samples, max > screening val; eval uncertainty
	Crab	Muscle	7440-38-2	Arsenic, organic	1.23E+00	--	3.43E+00	--	mg/kg	South	S007	100	1.29E-01 - 1.35E-01	3.43E+00	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	7440-38-2	Arsenic, inorganic	1.37E-01	--	3.81E-01	--	mg/kg	South	S007	100	1.43E-02 - 1.50E-02	3.81E-01	--	2.77E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	7440-39-3	Barium	1.77E-01	U	5.15E+00	--	mg/kg	North	N006	92	1.75E-01 - 1.84E-01	5.15E+00	--	1.74E+01	nc	--	N	Max ≤ screening val
	Crab	Muscle	7440-41-7	Beryllium	1.35E-02	U	1.42E-02	U	mg/kg	South, North	131, 132, N006, N007	0	1.35E-02 - 1.42E-02	1.42E-02	U	1.74E-01	nc	--	N	Not detected, max DL ≤ screening val
	Crab	Muscle	7440-43-9	Cadmium	4.38E-02	U	9.33E-01	--	mg/kg	Central	C003	6	4.38E-02 - 4.60E-02	9.33E-01	--	8.69E-02	nc	--	Y	Max > screening val
	Crab	Muscle	7440-70-2	Calcium	5.49E+02	J	1.88E+04	--	mg/kg	South	S008	100	1.77E+01 - 1.86E+01	1.88E+04	--	Essential nutrient	--	--	N	Essential nutrient

TABLE 3-11
RAGS PART D TABLE 2.4: OCCURRENCE, DISTRIBUTION, AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN – CRAB
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	CAS Number	Chemical (1)	Minimum Concentration (2)	Qualifier	Maximum Concentration (2)	Qualifier	Units	General Location of Maximum Concentration	Specific Location of Maximum Concentration	Detection Frequency %	Range of Detection Limits	Concentration Used for Screening (3)	Qualifier	Screening Toxicity Value (4)	ca/nc	Known Human Carcinogen	COPC Flag (Y/N)	Rationale for Selection or Deletion (5)
Biota																				
	Crab	Muscle	7440-47-3	Chromium [as Cr(III)]	9.52E-02	U	5.44E-01	--	mg/kg	South	S008	19	9.52E-02 - 1.00E-01	5.44E-01	--	8.32E-03	ca	Carc	Y	Known human carcinogen
	Crab	Muscle	7440-48-4	Cobalt	1.90E-02	U	2.59E-01	--	mg/kg	North	122	22	1.90E-02 - 2.00E-02	2.59E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Crab	Muscle	7440-50-8	Copper	8.79E+00	--	6.22E+01	--	mg/kg	North	122	100	7.62E-02 - 8.00E-02	6.22E+01	--	3.48E+00	nc	--	Y	Max > screening val
	Crab	Muscle	7439-89-6	Iron	4.49E+00	U	4.51E+01	--	mg/kg	Central	C003	97	4.40E+00 - 4.62E+00	4.51E+01	--	6.08E+01	nc	--	N	Max ≤ screening val
	Crab	Muscle	7439-92-1	Lead	2.48E-02	U	3.36E-01	--	mg/kg	North	122	86	2.48E-02 - 2.60E-02	3.36E-01	--	1.50E+00	nc	--	N	Max ≤ screening val
	Crab	Muscle	7439-95-4	Magnesium	3.59E+02	--	1.29E+03	--	mg/kg	South	S008	100	3.22E+00 - 3.38E+00	1.29E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Muscle	7439-96-5	Manganese	7.96E-01	J	3.51E+01	--	mg/kg	North	N006	100	1.60E-01 - 1.68E-01	3.51E+01	--	1.22E+01	nc	--	Y	Max > screening val
	Crab	Muscle	7439-97-6	Mercury	4.95E-02	--	2.84E-01	--	mg/kg	North	N002	100	3.44E-04 - 1.91E-03	2.84E-01	--	2.61E-02	nc	--	Y	Max > screening val
	Crab	Muscle	22967-92-6	Methyl Mercury	4.76E-02	--	3.33E-01	--	mg/kg	Central	126	100	4.00E-04 - 1.90E-03	3.33E-01	--	8.69E-03	nc	--	Y	Max > screening val
	Crab	Muscle	7440-02-0	Nickel	1.79E-01	U	4.04E-01	--	mg/kg	North	122	11	1.79E-01 - 1.88E-01	4.04E-01	--	1.74E+00	nc	--	N	Max ≤ screening val
	Crab	Muscle	7440-09-7	Potassium	2.48E+03	--	7.09E+03	--	mg/kg	North	123	100	1.17E+01 - 1.22E+01	7.09E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Muscle	7782-49-2	Selenium	5.19E-01	--	1.61E+00	--	mg/kg	Central	C003	100	9.52E-02 - 1.00E-01	1.61E+00	--	4.35E-01	nc	--	Y	Max > screening val
	Crab	Muscle	7440-22-4	Silver	1.27E-01	--	1.81E+00	--	mg/kg	North	122	100	1.90E-02 - 2.00E-02	1.81E+00	--	4.35E-01	nc	--	Y	Max > screening val
	Crab	Muscle	7440-23-5	Sodium	1.52E+03	--	4.18E+03	--	mg/kg	North	122	100	1.07E+01 - 1.12E+01	4.18E+03	--	Essential nutrient	--	--	N	Essential nutrient
	Crab	Muscle	7440-28-0	Thallium	2.86E-02	U	3.00E-02	U	mg/kg	South, North	131, 132, N006, N007	0	2.86E-02 - 3.00E-02	3.00E-02	U	8.69E-04	nc	--	UNC	Not detected, max DL > screening val; eval uncertainty
	Crab	Muscle	7440-32-6	Titanium	1.62E-01	U	2.72E-01	J	mg/kg	Central	C003	22	1.62E-01 - 1.70E-01	2.72E-01	J	No screening level	--	--	UNC	Chem lacks screening val; eval uncertainty
	Crab	Muscle	7440-62-2	Vanadium	2.86E-02	U	1.58E-01	--	mg/kg	North	N004	42	2.86E-02 - 3.00E-02	1.58E-01	--	4.38E-01	nc	--	N	Max ≤ screening val
	Crab	Muscle	7440-66-6	Zinc	3.12E+01	--	6.50E+01	--	mg/kg	North	N007	100	7.05E-01 - 7.40E-01	6.50E+01	--	2.61E+01	nc	--	Y	Max > screening val

Definitions

ARAR - Applicable or Relevant and Appropriate Requirements, ca - based on carcinogenic effects, Carc - known human carcinogen, chem - chemical, chems - chemicals, COPC - chemical of potential concern, cPAH - carcinogenic PAH, DF - dioxin/furan, DL - detection limit, DLC - dioxin-like compound, eval - evaluate, gen - general, ID - identify, KM - Kaplan-Meier, max - maximum, nc-noncancer, non-DL - nondioxin-like, m - federal MCL, MCL - maximum contaminant level, NA - not applicable, nc - based on noncarcinogenic effects, N - no, NBE - Newark Bay east, NBN - Newark Bay north, NBS - Newark Bay south, NDL-PCB - nondioxin-like PCB, NNE - north-northeast, NNW - north-northwest, NJ - based on New Jersey Department of Environmental Protection Surface Water Quality Criteria for Human Health, Saline Water, param - parameter, PAH - polycyclic aromatic hydrocarbon, PCB - polychlorinated biphenyl, RSL - regional screening level, SV - small volume, TBC - To Be Considered, TEQ - toxicity equivalence, µg/L - microgram per liter, UNC - evaluate in Uncertainty Section, USEPA - US Environmental Protection Agency, UNC - evaluate in Uncertainty Section, val - value, Y - yes

Notes

(1) Tissue samples were analyzed for total arsenic, which includes both inorganic and organic arsenic. As discussed in the text, it was assumed that 10% of the total arsenic in tissue is inorganic arsenic, and 90% of the total arsenic is organic arsenic.
(2) Qualifier codes: J - estimated value, U - not detected
(3) The Concentration Used for Screening is the maximum reported concentration for a chemical. For non-detected chemicals, this concentration is equivalent to the maximum detection limit.
(4) Tissue screening levels were calculated using the USEPA RSL online calculator assuming an adult fish ingestion rate of 34.6 g/d, per the USEPA 2012 Technical Memorandum: Fish and Crab Consumption Rates for the LPRSA Human Health Risk Assessment. Some screening values are appropriate toxicity surrogates, when a value for the particular chemical is not available.
(5) Chemicals were screened according to procedures outlined in the risk assessment text. Briefly, detected known human carcinogens were retained; essential nutrients were excluded. Chemicals detected in ≤5% of samples were excluded as COPCs, but flagged for evaluation in the Uncertainty Section if their maximum concentration exceeds the screening value. Non-detected chemicals with detection limits above the screening value are discussed qualitatively for their uncertainty. All DLCs were retained; all 7 cPAHs were retained if at least 1 was a COPC. For the remaining chemicals, if the maximum concentration was ≤ the screening value, they were excluded. Chemicals lacking a screening value are discussed in the Uncertainty Section. Background concentrations were not considered in the screening process, and potential ARAR/TBC values were not relevant. Note that only 6 of the 7 cPAHs were analyzed in crab.

Reference

USEPA 2012. Technical Memorandum Fish and Crab Consumption Rates for the LPRSA Human Health Risk Assessment. February 2.

TABLE 3-12
ANALYSIS OF TISSUE COPCS NOT IDENTIFIED AS SURFACE WATER OR SEDIMENT COPCS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Tissue COPCs (a)	Surface Water?	Surface Sediment?	Surface Water (µg/L) Detection Frequency	Minimum Concentration	Qualifier	Maximum Concentration	Qualifier	Accessible Surface Sediment (mg/kg) Detection Frequency	Minimum Concentration	Qualifier	Maximum Concentration	Qualifier
Pesticides & Organics												
Benzaldehyde	No	No	5:73	2.40E-01	J	1.10E+00	U	2:36	8.20E-02	U	2.10E-01	J
Chlordane, alpha (cis)	No	No	74:74	5.80E-05	J	5.32E-04	--	40:41	9.59E-06	U	9.29E-03	--
Chlordane, gamma (trans)	No	No	69:74	6.20E-05	J	4.10E-04	--	40:41	1.14E-05	U	1.27E-02	J
Heptachlor epoxide, trans-	No	No	NA	NA	NA	NA	NA	20:41	1.29E-05	U	1.08E-03	--
Mirex	No	No	NA	NA	NA	NA	NA	4:39	4.91E-06	U	2.44E-04	--
Nonachlor, cis-	No	No	42:73	1.24E-05	U	4.00E-04	U	36:41	1.01E-05	U	2.54E-03	--
Nonachlor, trans-	No	No	71:74	2.68E-05	J	4.00E-04	U	37:41	7.60E-06	U	4.55E-03	--
Oxychlordane	No	No	7:73	4.89E-06	U	4.10E-04	U	6:41	8.66E-06	U	7.66E-05	--
Pyridine	No	No	NA	NA	NA	NA	NA	0:36	8.20E-02	U	1.70E-01	U
Inorganics												
Arsenic, organic	No	No	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Mercury	No	No	66:74	2.20E-05	J	2.94E-04	--	41:41	1.10E-04	--	1.19E-02	--
Selenium	No	No	12:74	2.00E-01	J	1.00E+00	U	41:41	1.41E-01	J	3.74E+00	J
Silver	No	No	64:74	4.00E-03	J	8.38E-01	--	41:41	1.17E-01	J	5.80E+00	--

Notes:
COPC - Chemical of Potential Concern
J - Estimated value
mg/kg - milligram per kilogram
NA - Not analyzed
U - not detected
µg/L - microgram per liter
(a) Includes chemicals identified as a COPC in one or more species of fish or crab tissue types.

TABLE 3-13
SUMMARY OF COPCS SELECTED FOR EVALUATION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

	COPCs for Baseline Human Health Risk Assessment										
			Biota (*See Note Below)								
			Crab Tissue			Fish Species					
COPCs	Sediment	Surface Water	Crab (H+M)	Crab (Muscle)	Crab (Hepatopancreas)	American Eel	Bluefish	Striped Bass	Summer Flounder	White Perch	Mixed Fish/ All Species
Dioxin-like Compounds											
2,3,7,8-TCDD	X	X	X	X	X	X	X	X	X	X	X
1,2,3,7,8-PeCDD	X	X	X	X	X	X	X	X	X	X	X
1,2,3,4,7,8-HxCDD	X	X	X	X	X	X	X	X	X	X	X
1,2,3,6,7,8-HxCDD	X	X	X	X	X	X	X	X	X	X	X
1,2,3,7,8,9-HxCDD	X	X	X	X	X	X	X	X	X	X	X
1,2,3,4,6,7,8-HpCDD	X	X	X	X	X	X	X	X	X	X	X
OCDD	X	X	X	X	X	X	X	X	X	X	X
2,3,7,8-TCDF	X	X	X	X	X	X	X	X	X	X	X
1,2,3,7,8-PeCDF	X	X	X	X	X	X	X	X	X	X	X
2,3,4,7,8-PeCDF	X	X	X	X	X	X	X	X	X	X	X
1,2,3,4,7,8-HxCDF	X	X	X	X	X	X	X	X	X	X	X
1,2,3,6,7,8-HxCDF	X	X	X	X	X	X	X	X	X	X	X
1,2,3,7,8,9-HxCDF	X	X	X	X	X	X	X	X	X	X	X
2,3,4,6,7,8-HxCDF	X	X	X	X	X	X	X	X	X	X	X
1,2,3,4,6,7,8-HpCDF	X	X	X	X	X	X	X	X	X	X	X
1,2,3,4,7,8,9-HpCDF	X	X	X	X	X	X	X	X	X	X	X
OCDF	X	X	X	X	X	X	X	X	X	X	X
KM TEQ DF	X	X	X	X	X	X	X	X	X	X	X
PCB-77	X	X	X	X	X	X	X	X	X	X	X
PCB-81	X	X	X	X	X	X	X	X	X	X	X
PCB-105	X	X	X	X	X	X	X	X	X	X	X
PCB-114	X	X	X	X	X	X	X	X	X	X	X
PCB-118	X	X	X	X	X	X	X	X	X	X	X
PCB-123	X	X	X	X	X	X	X	X	X	X	X
PCB-126	X	X	X	X	X	X	X	X	X	X	X
PCB-156/157	X	X	X	X	X	X	X	X	X	X	X
PCB-167	X	X	X	X	X	X	X	X	X	X	X
PCB-169	X	X	X	X	X	X	X	X	X	X	X
PCB-189	X	X	X	X	X	X	X	X	X	X	X
KM TEQ PCB	X	X	X	X	X	X	X	X	X	X	X
Non-DL PCBs											
Total Non-DL PCBs	X	X	X	X	X	X	X	X	X	X	X
PAHs											
Benz(a)anthracene	X	X	X	X	X						X
Benzo(a)pyrene	X	X	X	X	X	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	X
Benzo(b)fluoranthene	X	X	X	X	X						X
Benzo(j,k)fluoranthene			UNC (2)	UNC (1)	UNC (2)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Benzo(k)fluoranthene	X	X									
Chrysene	X	X	X	X	X						X
Dibenz(a,h)anthracene	X	X	X	X	X	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	X
Indeno(1,2,3-c,d)-pyrene	X	X	X	X	X						X
Naphthalene		X									
Pesticides & Organics											
1,1,2-Trichloroethane		UNC (1)									
1,1,2,2-Tetrachloroethane		UNC (1)									
1,2-Dibromo-3-chloropropane		UNC (1)									
1,2-Dibromoethane		UNC (1)									

TABLE 3-13
SUMMARY OF COPCS SELECTED FOR EVALUATION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

	COPCs for Baseline Human Health Risk Assessment										
			Biota (*See Note Below)								
			Crab Tissue			Fish Species					
		Surface	Crab	Crab	Crab	American		Striped	Summer	White	Mixed Fish/
COPCs	Sediment	Water	(H+M)	(Muscle)	(Hepatopancreas)	Eel	Bluefish	Bass	Flounder	Perch	All Species
1,2-Dichloroethane		UNC (1)									
1,2-Diphenylhydrazine			UNC (2)	UNC (1)	UNC (2)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
1,2,3-Trichlorobenzene		UNC (1)									
1,2,4-Trichlorobenzene		UNC (2)									
1,2,4,5-Tetrachlorobenzene		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
1,4-Dichlorobenzene		UNC (2)									
1,4-Dioxane		UNC (1)									
2-Chlorophenol					UNC (1)						
2-Hexanone		UNC (1)									
2,4-Dichlorophenol			UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
2,4-Dinitrophenol		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
2,4-Dinitrotoluene		UNC (2)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
2,4,6-Trichlorophenol		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
2,4'-DDD		X			X	X		X	X	X	X
2,4'-DDE		X						X		X	X
2,4'-DDT		X								X	X
2,6-Dinitrotoluene		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
3-Nitroaniline			UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
3,3'-Dichlorobenzidine		UNC (1)	UNC (2)	UNC (2)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
4-Bromophenyl phenyl ether	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	
4-Chloroaniline		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
4-Chlorophenyl phenyl ether	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	
4-Nitroaniline		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
4,4'-DDD		X	X	X	X	X	X	X	X	X	X
4,4'-DDE		X	X	X	X	X	X	X	X	X	X
4,4'-DDT		X			X	X	X	X		X	X
4,6-Dinitro-2-methylphenol		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Aldrin		X									
Atrazine		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Benzaldehyde			X	UNC (2)	X	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	X
Benzene		UNC (4)									
Benzidine	UNC (4)		UNC (4)	UNC (4)	UNC (4)	UNC (4)	UNC (4)	UNC (4)	UNC (4)	UNC (4)	
Biphenyl		UNC (1)			UNC (1)						
bis(2-Chloroethoxy)methane			UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Bis(2-chloroethyl)ether		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Bis(2-ethylhexyl)phthalate		UNC (2)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Butyl benzyl phthalate					UNC (1)						
Carbon tetrachloride		UNC (1)									
Chlordane, alpha (cis)						X	X	X		X	X
Chlordane, gamma (trans)								X			X
Chloroform		X									
cis-1,3-Dichloropropene		UNC (1)									
Di-n-octyl phthalate			UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Dibenzofuran		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Dichlorobromomethane		UNC (1)									
Dieldrin		X	X	X	X	X	X	X	X	X	X
Heptachlor		X									
Heptachlor epoxide, cis-		X	X	X	X	X	X	X	X	X	X

TABLE 3-13
SUMMARY OF COPCS SELECTED FOR EVALUATION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

	COPCs for Baseline Human Health Risk Assessment										
			Biota (*See Note Below)								
			Crab Tissue			Fish Species					
COPCs	Sediment	Surface Water	Crab (H+M)	Crab (Muscle)	Crab (Hepatopancreas)	American Eel	Bluefish	Striped Bass	Summer Flounder	White Perch	Mixed Fish/ All Species
Heptachlor epoxide, trans-			X	X	X	X					X
Hexachlorobenzene		X			X	X		X			X
Hexachlorobutadiene		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Hexachlorocyclopentadiene	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Hexachloroethane		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Mirex			X		X	X		X		X	X
N-nitroso-di-n-propylamine		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Nitrobenzene		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Nonachlor, cis-					X	X		X			X
Nonachlor, trans-			X		X	X		X		X	X
Oxychlordane			X		X	X					X
PHC as gasoline	X										
Pentachlorophenol		UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Pyridine			X	X	X	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	X
TPH (C9-C40)	X										
Trans-1,3-dichloropropene		UNC (1)									
Trichloroethylene		X									
Vinyl chloride		UNC (4)									
Inorganics											
Aluminum	X				X						X
Antimony	X	X	UNC (2)	UNC (2)	UNC (1)	UNC (1)	UNC (1)	UNC (2)	UNC (1)	UNC (1)	
Arsenic, organic			X	X	X	X	X	X	X	X	X
Arsenic, inorganic	X	X	X	X	X	X	X	X	X	X	X
Cadmium	X		X	X	X						X
Chromium (VI)	X	X									
Chromium [as Cr(III)]	X	X	X	X	X	X	X	X	X	X	X
Cobalt	X		X	X	X	X	X		X		X
Copper	X		X	X	X						X
Cyanide		UNC (2)									
Iron	X	X	X		X						X
Lead	X				X						X
Manganese	X	X	X	X	X						X
Mercury	X	X	X	X	X	X	X	X	X	X	X
Methyl Mercury			X	X	X	X	X	X	X	X	X
Nickel	X										
Selenium			X	X	X	X	X	X	X	X	X
Silver			X	X	X						X
Sulfide	UNC (3)	UNC (3)									
Thallium	X	X	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	UNC (1)	
Titanium		X	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	UNC (3)	
Vanadium	X				X						X
Zinc	X		X	X	X	X					X

Notes:
COPC - chemical of potential concern
H+M - hepatopancreas plus muscle
UNC - Address chemical in uncertainty evaluation.
X - COPC for evaluation in Baseline Human Health Risk Assessment (BHHRA)
USEPA Regional Screening Levels (RSLs) for tap water used for surface water and residential soil RSLs used for surface sediment (November 2018).

TABLE 3-13
SUMMARY OF COPCS SELECTED FOR EVALUATION
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

	COPCs for Baseline Human Health Risk Assessment										
			Biota (*See Note Below)								
			Crab Tissue			Fish Species					
COPCs	Sediment	Surface Water	Crab (H+M)	Crab (Muscle)	Crab (Hepatopancreas)	American Eel	Bluefish	Striped Bass	Summer Flounder	White Perch	Mixed Fish/ All Species

Tissue screening levels were calculated using the EPA RSL online calculator. Screening levels for carcinogens were calculated for adult exposure, assuming an ingestion rate of 54 g/d. Screening values for noncarcinogens were calculated for a child exposure, assuming an ingestion rate of 18 g/d.

See Appendix B, Screening Levels and Surrogates Used in Selection of COPCs for additional information.

(1) Compound was not detected, but the maximum detection limit exceeds the screening level, therefore the compound is discussed in the uncertainy section of the BHHRA, except when a chemical was identifed as a COPC in another tissue type. In those cases, the chemical was identified as a COPC and evaluated in the quantitative risk assessment for all tissue types and not further discussed in the uncertainty evaluation (benzaldeyde, benzo(a)pyrene, dibenz(a,h)anthracene, and pyridine).

(2) Compound was detected in ≤5% of samples but the maximum concentration exceeds the screening level, therefore the compound is discussed in the uncertainy section of the BHHRA, except when a chemical was identifed as a COPC in another tissue type. In those cases, the chemical was identified as a COPC and evaluated in the quantitative risk assessment for all tissue types and not further discussed in the uncertainty evaluation (benzaldeyde).

(3) Compound was detected but no screening level available, therefore the compound is discussed in the uncertainty section of the BHHRA.

(4) Compound is a known human carcinogen but not detected, therefore the compound is discussed in the uncertainty section of the BHHRA.

*For consistency, if a chemical was identified as a COPC in any fish or crab tissue, it was retained as a COPC for all tissue types. Therefore, the COPC lists used in the BHHRA are identical for all types of biota; this list is reflected in the Mixed Fish/All Species column.

TABLE 4-1
RAGS D TABLE 1: SELECTION OF EXPOSURE PATHWAYS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Biota Tissue	Fish Tissue	Fish from NBSA	Angler/Sportsman	Young Child (1 to <7 years)	Ingestion	Quantitative	Site-related contaminants have been detected in fish. Studies have found that, despite Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters, individuals do fish in Newark Bay and consume fish. This pathway assumes that the receptor will consume fish caught from Newark Bay and share it with family members.
					Adolescent (7 to <19 years)	Ingestion	Quantitative	
					Adult (>18 years)	Ingestion	Quantitative	
		Crab Tissue	Crabs from NBSA	Angler/Sportsman	Young Child (1 to <7 years)	Ingestion	Quantitative	Site-related contaminants have been detected in crabs. Studies have found that, despite Health Advisories for Eating Fish and Crabs in New Jersey Waters, individuals do crab in the Newark Bay area and consume crabs. This pathway assumes that the receptor will consume crabs caught from Newark Bay and share them with family members.
					Adolescent (7 to <19 years)	Ingestion	Quantitative	
					Adult (>18 years)	Ingestion	Quantitative	
		Waterfowl, turtles, etc	Other species from NBSA	Angler/Sportsman	Young Child (1 to <7 years)	Ingestion	Qualitative	The New Jersey Division of Fish and Wildlife, Bureau of Law Enforcement has not observed anyone hunting in the NBSA. These data collectively indicate that hunting in this area is not likely to occur and hunters do not frequent the area. Therefore, ingestion of waterfowl and animals other than fish/crabs is likely to be minimal. This topic is discussed further in the uncertainty section.
					Adolescent (7 to <19 years)	Ingestion	Qualitative	
					Adult (>18 years)	Ingestion	Qualitative	
		Fish/crab/other species	Fish/crab/other species	Transient Person	Multiple ages	Ingestion	Qualitative	Evidence of homeless camps has been observed in the study area. Limited exposure pattern data would make quantification highly uncertain. Potential risks relative to other receptors are discussed in the uncertainty section.
	Intertidal/ Subtidal Surface Sediment	Accessible Surface Sediment	Accessible Surface Sediment	Angler/Sportsman	Child (1 to <7 years)	Incidental Ingestion	None	Angler may contact sediment while fishing or crabbing from the banks of the Bay. It is assumed that the young child (1 to <7 years) would not typically accompany adult anglers due to safety concerns. Inhalation may occur if activities are in mudflat areas and volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible.
						Dermal Contact	None	
						Inhalation of Vapors	None	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
				Swimmer	Child (1 to <7 years)	Incidental Ingestion	Quantitative	Swimming does occur in Newark Bay. Swimmers may contact sediment while entering and leaving the Bay from the banks of the water. Inhalation may occur if activities are in mudflat areas and volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible.
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
				Wader	Child (1 to <7 years)	Incidental Ingestion	Quantitative	Families visiting parks along the banks or wading down by the Bay to bird watch may contact sediment along the banks. Inhalation may occur if activities are in mudflat areas and volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible.
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	

TABLE 4-1
RAGS D TABLE 1: SELECTION OF EXPOSURE PATHWAYS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future (continued)	Intertidal/ Subtidal Surface Sediment (continued)	Accessible Surface Sediment (continued)	Accessible Surface Sediment (continued)	Boater	Child (1 to <7 years)	Incidental Ingestion	None	There is the potential for recreational boating, including kayaking, to occur in the Bay. It is assumed that the boater's potential for exposure to Bay sediment is greatest while boating in small crafts such as sculls, kayaks, or canoes. Docks are typically used, but boaters may occasionally contact sediment when a boat flips and wading is necessary. Inhalation may occur if activities are in mudflat areas and volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible. Young children (<7 years old) are not expected to participate in boating activities on the Bay; any such exposure would be rare and much less than that experienced by young children visiting the Bay specifically to wade or swim. Therefore, a young child boater scenario is not evaluated.
						Dermal Contact	None	
						Inhalation of Vapors	None	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	None	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	None	
				Worker	Adult (>18 years)	Incidental Ingestion	Quantitative	Workers may be tasked with collecting shoreline trash or other work that leads to contact with sediment along the Bay. Inhalation may occur if activities are in mudflat areas and volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negliglble. Contact with surface water is not typically expected to occur.
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
				Resident	Child (1 to <7 years)	Incidental Ingestion	Qualitative	Residential properties are located near the Bay. Residents may contact sediment during activities near their homes. Potential risks relative to other receptors are discussed in the uncertainty section.
						Dermal Contact	Qualitative	
						Inhalation of Vapors	Qualitative	
					Adult (>18 years)	Incidental Ingestion	Qualitative	
						Dermal Contact	Qualitative	
						Inhalation of Vapors	Qualitative	
				Transient Person	Multiple ages	Incidental Ingestion	Qualitative	Evidence of homeless camps has been observed in the study area. Limited exposure pattern data would make quantification highly uncertain. Potential risks relative to other receptors are discussed in the uncertainty section.
						Dermal Contact	Qualitative	
						Inhalation of Vapors	Qualitative	
	Surface Water	Surface Water	Baywide	Angler/Sportsman	Child (1 to <7 years)	Incidental Ingestion	None	Anglers may contact surface water while fishing or crabbing from the bank. Assumes that young children (1 to <7 years) would not typically accompany adult anglers due to safety concerns. Inhalation may occur if volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negliglble.
						Dermal Contact	None	
						Inhalation of Vapors	None	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
				Swimmer	Child (1 to <7 years)	Incidental Ingestion	Quantitative	Swimming does occur in the Bay. Swimmers may contact surface water while swimming. Inhalation may occur if volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negliglble.
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
				Wader	Child (1 to <7 years)	Incidental Ingestion	Quantitative	Families visiting parks along the banks or wading down by the Bay to bird watch may come into contact with surface water along the banks. Inhalation may occur if volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negliglble.
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	Quantitative	

TABLE 4-1
RAGS D TABLE 1: SELECTION OF EXPOSURE PATHWAYS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future (continued)	Surface Water (continued)	Surface Water (continued)	Baywide (continued)	Boater	Child (1 to <7 years)	Incidental Ingestion	None	There is the potential for recreational boating, including kayaking, to occur in the Bay. It is assumed that the boater's potential for exposure to Bay surface water is greatest while boating in small crafts such as sculls, kayaks, or canoes. Docks are typically used, but boaters may occasionally contact the water when a boat flips and wading is necessary. Inhalation may occur if activities are in mudflat areas and volatiles are present; however, this pathway is not considered further in the BHHRA, because the inhalation pathway risks are negligible. Young children (<7 years old) are not expected to participate in boating activities on the Bay; any such exposure would be rare and much less than that experienced by young children visiting the Bay specifically to wade or swim. Therefore, a young child boater scenario is not evaluated.
						Dermal Contact	None	
						Inhalation of Vapors	None	
					Adolescent (7 to <19 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	None	
					Adult (>18 years)	Incidental Ingestion	Quantitative	
						Dermal Contact	Quantitative	
						Inhalation of Vapors	None	
				Resident	Child (1 to <7 years)	Incidental Ingestion	Qualitative	Residential properties are located adjacent to the Bay. Limited residential areas were observed along the eastern shore of the Bay; these areas have either man-made or natural barriers to impede human access of the Bay. Surface water from the Bay is not used as a domestic water supply. Residents may contact surface water during activities near their homes. Potential risks relative to other receptors are discussed in the uncertainty section.
						Dermal Contact	Qualitative	
						Inhalation of Vapors	Qualitative	
					Adult (>18 years)	Incidental Ingestion	Qualitative	
						Dermal Contact	Qualitative	
						Inhalation of Vapors	Qualitative	
				Transient Person	Multiple ages	Incidental Ingestion	Qualitative	Evidence of homeless camps has been observed in the study area. Limited exposure pattern data would make quantification highly uncertain. Potential risks relative to other receptors are discussed in the uncertainty section.
						Dermal Contact	Qualitative	
						Inhalation of Vapors	Qualitative	

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by EPA on February 8, 2017, and EPA review of responses provided April 21, 2017, and July 14, 2017.

TABLE 4-2
RAGS PART D TABLE 4.1: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water
Receptor Population: Angler/Sportsman - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler/Sportsman	Adult	Fish/Crab	Ct	Exposure Point Concentration - Tissue	mg/kg wet weight	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				IRF	Ingestion rate of fish	g/d	34.6	USEPA 2012a	3.9	USEPA 2012a	Intake (mg/kg-day) =
				IRC	Ingestion rate of crab	g/d	20.9	USEPA 2012a	3.0	USEPA 2012a	
				FI	Fraction from source	unitless	1	Assumed 100% of fish/crab consumed is from NBSA	1	Assumed 100% of fish/crab consumed is from NBSA	<u>Ct x EF x ED x IR x (1-Loss) x FI x CF1</u>
				EF	Exposure frequency	d/yr	365	Fish ingestion rate already averaged over one year	365	Fish ingestion rate already averaged over one year	AT x BW
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				Loss	Cooking loss for fish	g/g	0	Assumed 100% of chemical remains in fish	Chemical-specific	USEPA 2000a,b in addition to more recent publications if any	
				Loss	Cooking loss for crab	g/g	0	Assumed 100% of chemical remains in crab	0	Assumed 100% of chemical remains in crab	
				CF1	Conversion factor	kg/g	1E-03	--	1E-03	--	
				BW	Body weight	kg	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
Incidental Ingestion	Angler/Sportsman	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	<u>Cs x EF x ED x RBA x IRsed x FI x CF2</u>
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	AT x BW
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 2014)	25	Assumed to be one-half RME	Arsenic RBA is 0.6; RBA for other chemicals is 1 (USEPA 2012b, USEPA 2018)
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Dermal Contact	Angler/Sportsman	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	<u>Cs x EF x ED x SA x AF x ABS x FI x CF2</u>
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	AT x BW
				SA	Skin surface area	cm^2/d	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	
				AF	Adherence factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	Assumes 1 dermal event per exposure day
				ABS	Dermal absorption factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	

TABLE 4-2
RAGS PART D TABLE 4.1: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water
Receptor Population: Angler/Sportsman - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Angler/Sportsman	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Wate	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	$\frac{Cwat \ x \ EF \ x \ ED \ x \ IRwat \ x \ ET \ x \ FI}{AT \ x \ BW \ x \ CF4}$
				IRwat	Ingestion rate of surface water	L/hr	0.011	50% of the mean swimming rate for adults (USEPA 2011)	0.011	50% of the mean swimming rate for adults (USEPA 2011)	
				ET	Exposure Time	hr/d	1	Professional judgment	0.5	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	μg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Dermal Contact	Angler/Sportsman	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Wate	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	DAD = dermally absorbed dose (mg/kg-day)
				DA_{event}	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	$Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
				ET	Exposure time	hr/d	1	Professional judgment	0.5	Assumed to be one-half RME	
				CF2	Conversion Factor	μg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				T	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent for inorganics or highly ionized organics:
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	DAevent = Cwat × Kp × ET × CF2
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	DAevent for organics:
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	If ET ≦ t*, then
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
				EV	Event frequency	event/d	1	Professional judgment	1	Professional judgment	$DA_{event} = 2\,FA \times Kp \times Cwat \times CF2 \sqrt{\frac{6T \times ET}{\Pi}}$
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	If ET > t*, then
				SA	Skin surface area	cm^2	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	$DA_{event} = FA \times Kp \times Cwat \times CF2 \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

TABLE 4-2
RAGS PART D TABLE 4.1: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future Medium: Sediment, Surface Water Exposure Medium: Fish/Crab, Sediment, Surface Water Receptor Population: Angler/Sportsman - Adult Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, g/d - gram per day, g/g - gram per gram, hr - hour, hr/d - hour per day, hr/event - hour per event, kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure, µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

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TABLE 4-3
RAGS PART D TABLE 4.2: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler/Sportsman	Adolescent	Fish/Crab	Ct	Exposure Point Concentration - Tissue	mg/kg wet weight	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				IRF	Ingestion rate of fish	g/d	23.1	Assumed to be 2/3 of adult ingestion (USEPA 2012a)	2.6	Assumed to be 2/3 of adult ingestion (USEPA default)	Intake (mg/kg-day) =
				IRC	Ingestion rate of crab	g/d	13.9	Assumed to be 2/3 of adult ingestion (USEPA 2012a)	2.0	Assumed to be 2/3 of adult ingestion (USEPA default)	
				FI	Fraction from source	unitless	1	Assumed 100% of fish/crab consumed is from NBSA	1	Assumed 100% of fish/crab consumed is from NBSA	Ct x EF x ED x IR x (1-Loss) x FI x CF1 / AT x BW
				EF	Exposure frequency	d/yr	365	Fish ingestion rate already averaged over one year	365	Fish ingestion rate already averaged over one year	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				Loss	Cooking loss for fish	g/g	0	Assumed 100% of chemical remains in fish	Chemical-specific	USEPA 2000a,b in addition to more recent publications if any	
				Loss	Cooking loss for crab	g/g	0	Assumed 100% of chemical remains in crab	0	Assumed 100% of chemical remains in crab	
				CF1	Conversion factor	kg/g	1E-03	--	1E-03	--	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
Incidental Ingestion	Angler/Sportsman	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	Cs x EF x ED x RBA x IRsed x FI x CF2 / AT x BW
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	Arsenic RBA is 0.6; RBA for other chemicals is 1 (USEPA 2012b, USEPA 2018)
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 2014)	25	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Dermal Contact	Angler/Sportsman	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	Cs x EF x ED x SA x AF x ABS x FI x CF2 / AT x BW
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	
				SA	Skin surface area	cm^2/d	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
				AF	Adherence factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	Assumes 1 dermal event per exposure day
				ABS	Dermal absorption factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	

TABLE 4-3
RAGS PART D TABLE 4.2: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Angler/Sportsman	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Wate	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	$\frac{Cwat \times EF \times ED \times IRwat \times ET \times FI}{AT \times BW \times CF4}$
				IRwat	Ingestion rate of surface water	L/hr	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	
				ET	Exposure time	hr/d	1	Professional judgment	0.5	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Dermal Contact	Angler/Sportsman	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Wate	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	DAD = dermally absorbed dose (mg/kg-day)
				DA_{event}	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	1	Professional judgment	0.5	Assumed to be one-half RME	$Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				T	Lag time per event	hr/evnt	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent for inorganics or highly ionized organics:
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	DAevent = Cwat × Kp × ET × CF2
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	DAevent for organics:
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	If ET ≦ t*, then
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
				EV	Event frequency	event/d	1	Assumes receptor goes fishing once per day	1	Assumes receptor goes fishing once per day	$DA_{event} = 2\,FA \times Kp \times Cwat \times CF2 \sqrt{\frac{6T \times ET}{\Pi}}$
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	If ET > t*, then
				SA	Skin surface area	cm^2	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	$DA_{event} = FA \times Kp \times Cwat \times CF2 \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

TABLE 4-3
RAGS PART D TABLE 4.2: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, g/d - gram per day, g/g - gram per gram, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

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USEPA 2000b. Phase 2 Report, Further Site Characterization and Analysis, Vol. 2F - Revised Human Health Risk Assessment, Hudson River PCBs Reassessment RI/FS. Upper Hudson River, Mid-Hudson River. Prepared for USEPA Region 2 and US Army Corps of Engineers, Kansas City District by TAMS Consultants, Inc., Gradient Corporation. November.

TABLE 4-4
RAGS PART D TABLE 4.3: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR CHILD ANGLER/SPORTSMAN RECEPTOR - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab
Receptor Population: Angler/Sportsman - Child
Receptor Age: 1-<7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler/Sportsman	Child	Fish/Crab	Ct	Exposure Point Concentration - Tissue	mg/kg wet weight	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				IRF	Ingestion rate of fish	g/d	11.5	Assumed to be 1/3 of adult ingestion (USEPA 2012)	1.3	Assumed to be 1/3 of adult ingestion (USEPA 2012)	Intake (mg/kg-day) =
				IRC	Ingestion rate of crab	g/d	7.0	Assumed to be 1/3 of adult ingestion (USEPA 2012)	1.0	Assumed to be 1/3 of adult ingestion (USEPA 2012)	
				FI	Fraction from source	unitless	1	Assumed 100% of fish/crab consumed is from NBSA	1	Assumed 100% of fish/crab consumed is from NBSA	Ct x EF x ED x IR x (1-Loss) x FI x CF1 / AT x BW
				EF	Exposure frequency	d/yr	365	Fish ingestion rate already averaged over one year	365	Fish ingestion rate already averaged over one year	
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				Loss	Cooking loss for fish	g/g	0	Assumed 100% of chemical remains in fish	Chemical-specific	USEPA 2000a,b in addition to more recent publications if any	
				Loss	Cooking loss for crab	g/g	0	Assumed 100% of chemical remains in crab	0	Assumed 100% of chemical remains in crab	
				CF1	Conversion factor	kg/g	1E-03	--	1E-03	--	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	

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Definitions
CTE - central tendency exposure, d - day, d/yr day per year, g/d - gram per day, g/g - gram per gram, kg - kilogram, kg/g - kilogram per gram, mg/kg - milligram per kilogram, RME - reasonable maximum exposure, yr - year

References
USEPA (US Environmental Protection Agency) 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Memorandum from: Dana Stalcup, Acting Director, Assessment and Remediation Division, Office of Superfund Remediation and Technology Innovation; To: Superfund National Policy Managers, Regions 1 -10. OSWER Directive 9200.1-120. Feb 6.
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USEPA 2000a. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 2, Risk Assessment and Fish Consumption Limits, Third Edition. Office of Water, EPA 823-B-00-008. November.
USEPA 2000b. Phase 2 Report, Further Site Characterization and Analysis, Vol. 2F - Revised Human Health Risk Assessment, Hudson River PCBs Reassessment RI/FS. Upper Hudson River, Mid-Hudson River. Prepared for USEPA Region 2 and US Army Corps of Engineers, Kansas City District by TAMS Consultants, Inc., Gradient Corporation. November.

TABLE 4-5
RAGS PART D TABLE 4.4: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT WORKER RECEPTOR - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Worker - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Worker	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	50	1 day/week, 50 weeks/year	25	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	25	USEPA 2014	7	USEPA 2011	Cs x EF x ED x RBA x IRsed x FI x CF2
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012, USEPA 2018	Chemical-specific	USEPA 2012, USEPA 2018	AT x BW
				IRsed	Ingestion rate of sediment	mg/d	50	USEPA 1991	25	Assumed to be one-half RME	Arsenic RBA is 0.6; RBA for other chemicals is 1 (USEPA 2012b, USEPA 2018)
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	9,125	ED x 365 d/yr	2,555	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	
Dermal Contact	Worker	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	50	1 day/week, 50 weeks/year	25	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	25	USEPA 2014	7	USEPA 2011	Cs x EF x ED x SA x AF x ABS x FI x CF2
				SA	Skin surface area	cm2/d	3,527	Mean default value for workers: head, hands, forearms (USEPA 2014)	3,527	Mean default value for workers: head, hands, forearms (USEPA 2014)	AT x BW
				AF	Adherence factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	Assumes 1 dermal event per exposure day
				ABSd	Dermal absorption factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	9,125	ED x 365 d/yr	2,555	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	

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The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, ehr - hour, hr/d - hour per day, kg - kilogram, kg/mg - kilogram per milligram, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure, µg/mg - microgram per milligram, yr - year

References

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TABLE 4-6
RAGS PART D TABLE 4.5: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT WADER, SWIMMER AND BOATER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer, Boater - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Wader	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	Cs x EF x ED x RBA x IRsed x FI x CF2
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	AT x BW
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 1991)	25	Assumed to be one-half RME	Arsenic RBA is 0.6; RBA for other chemicals is 1 (USEPA 2012b, USEPA 2018)
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	
Incidental Ingestion	Swimmer	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 1991)	25	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Incidental Ingestion	Boater	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	9	1 day/month, 8.5 months/year	4	Approx one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	U.S. EPA 1989	
				RBA	Relative bioavailability factor for soil (used for sediment)	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 1991)	25	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	

TABLE 4-6
RAGS PART D TABLE 4.5: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT WADER, SWIMMER AND BOATER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer, Boater - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Wader	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	$\frac{Cs \times EF \times ED \times SA \times AF \times ABS \times FI \times CF2}{AT \times BW}$
				SA	Skin surface area	cm2/d	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	
				AF	Adherence factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	Assumes 1 dermal event per exposure day
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Dermal Contact	Swimmer	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				SA	Skin surface area	cm2/d	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	
				AF	Adherence factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Dermal Contact	Boater	Adult	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	9	1 day/month, 8.5 months/year	4	Approx one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				SA	Skin surface area	cm2/d	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	
				AF	Adherence factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	

TABLE 4-6
RAGS PART D TABLE 4.5: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT WADER, SWIMMER AND BOATER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer, Boater - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

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The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

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TABLE 4-7
RAGS PART D TABLE 4.6: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT WADER, SWIMMER AND BOATER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer, Boater - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Wader	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	Cwat x ET x EF x ED X IRwat x FI
				IRwat	Ingestion rate of surface water	L/hr	0.011	50% of the mean swimming rate for adults (USEPA 2011)	0.011	50% of the mean swimming rate for adults (USEPA 2011)	AT x BW x CF4
				ET	Exposure Time	hr/day	1	Best professional judgment	0.5	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	
Incidental Ingestion	Swimmer	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				IRwat	Ingestion rate of surface water	L/hr	0.021	mean swimming rate for adults (USEPA 2011)	0.021	mean swimming rate for adults (USEPA 2011)	
				ET	Exposure Time	hr/d	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Incidental Ingestion	Boater	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	259	7 days/week for 37 weeks	111	3 days/week for 37 weeks	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				IRwat	Ingestion rate of surface water	L/hr	0.011	50% of the mean swimming rate for adults (USEPA 2011)	0.011	50% of the mean swimming rate for adults (USEPA 2011)	
				ET	Exposure time	hr/day	2	Based on assumption in Lower Passaic River Baseline Human Health Risk Assessment	1.5	Based on assumption in Lower Passaic River Baseline Human Health Risk Assessment	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Dermal Contact	Wader	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	DAD = dermally absorbed dose (mg/kg-day)
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	$Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
				ET	Exposure time	hr/d	1	Best professional judgment	0.5	Best professional judgment	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				τ	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent for inorganics or highly ionized organics:
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific	USEPA 2004	DAevent = Cwat × Kp × ET × CF2
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	DAevent for organics:
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	If ET ≦ t*, then
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
				EV	Event frequency	event/d	1	USEPA 2004	1	USEPA 2004	DA_{event}
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	$= 2\,FA \times Kp \times Cwat \times CF2 \sqrt{\frac{6T \times ET}{\Pi}}$
				EF	Exposure frequency	d/yr	13	1 day per week, 3 months/year	7	Assumed to be one-half RME	If ET > t*, then
				SA	Skin surface area	cm2	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	$DA_{event} = FA \times Kp \times Cwat \times CF2 \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
Dermal Contact	Swimmer	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				τ	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	

TABLE 4-7
RAGS PART D TABLE 4.6: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADULT WADER, SWIMMER AND BOATER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer, Boater - Adult
Receptor Age: >18 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
				EV	Event frequency	event/d	1	USEPA 2004	1	USEPA 2004	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
				SA	Skin surface area	cm2	20,900	Resident default whole body (USEPA 2014)	20,900	Resident default whole body (USEPA 2014)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed to be one-half RME	
Dermal Contact	Boater	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	2.0	Best professional judgment	1.5	Best professional judgment	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				τ	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
				EV	Event frequency	event/d	1	USEPA 2004	1	USEPA 2004	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				EF	Exposure frequency	d/yr	259	7 days/week for 37 weeks	111	3 days/week for 37 weeks	
				SA	Skin surface area	cm2	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

References

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TABLE 4-8
RAGS PART D TABLE 4.7: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT WADER, SWIMMER AND BOATER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer, Boater - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Wader	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months year	20	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	Cs x EF x ED x RBA x IRsed x FI x CF2
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	AT x BW
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 1991)	25	Assumed to be one-half RME	Arsenic RBA is 0.6; RBA for other chemicals is 1 (USEPA 2012b, USEPA 2018)
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Incidental Ingestion	Swimmer	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months year	20	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 1991)	25	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Incidental Ingestion	Boater	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months year	20	Approx one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				RBA	Relative bioavailability factor for soil (used for sediment)	unitless	Chemical-specific	USEPA 2012b, USEPA 2018	Chemical-specific	USEPA 2012b, USEPA 2018	
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 1991)	25	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	

TABLE 4-8
RAGS PART D TABLE 4.7: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT WADER, SWIMMER AND BOATER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer, Boater - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Wader	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	Cs x EF x ED x SA x AF x ABS x FI x CF2
				SA	Skin surface area	cm2/d	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	AT x BW
				AF	Adherence factor	mg/cm2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	Assumes 1 dermal event per exposure day
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Dermal Contact	Swimmer	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				SA	Skin surface area	cm2/d	4,436	Mean value for male/female 7 - 18 years: hands, lower legs, forearms, feet, and face (USEPA 2011)	4,436	Mean value for male/female 7 - 18 years: hands, lower legs, forearms, feet, and face (USEPA 2011)	
				AF	Adherence factor	mg/cm2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Dermal Contact	Boater	Adolescent	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months year	20	Approx one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				SA	Skin surface area	cm2/d	4,436	Mean value for male/female 7 - 18 years: hands, lower legs, forearms, feet, and face (USEPA 2011)	4,436	Mean value for male/female 7 - 18 years: hands, lower legs, forearms, feet, and face (USEPA 2011)	
				AF	Adherence factor	mg/cm2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	

TABLE 4-8
RAGS PART D TABLE 4.7: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT WADER, SWIMMER AND BOATER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer, Boater - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

References

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USEPA 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Memorandum from: Dana Stalcup, Acting Director, Assessment and Remediation Division, Office of Superfund Remediation and Technology Innovation; To: Superfund National Policy Managers, Regions 1 -10. OSWER Directive 9200.1-120. Feb 6.
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TABLE 4-9
RAGS PART D TABLE 4.8: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT WADER, SWIMMER AND BOATER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer, Boater - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Wader	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	Cwat x ET x EF x ED x IRwat x FI
				IRwat	Ingestion rate of surface water	L/hr	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	AT x BW x CF4
				ET	Exposure Time	hr/day	1	Best professional judgment	0.5	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Incidental Ingestion	Swimmer	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				IRwat	Ingestion rate of surface water	L/hr	0.05	USEPA 2011	0.05	USEPA 2011	
				ET	Exposure Time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Incidental Ingestion	Boater	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	98	7 days/week for 14 weeks	70	5 days/wk for 14 weeks	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				IRwat	Ingestion rate of surface water	L/hr	0.025	USEPA 2011	0.025	USEPA 2011	
				ET	Exposure time	hr/day	2	Best professional judgment	1.5	Best professional judgment	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	

TABLE 4-9
RAGS PART D TABLE 4.8: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT WADER, SWIMMER AND BOATER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer, Boater - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

Dermal Contact	Wader	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	DAD = dermally absorbed dose (mg/kg-day)
											$Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
											DAevent for inorganics or highly ionized organics:
											DAevent = Cwat × Kp × ET × CF2
											DAevent for organics:
											If ET ≦ t*, then
											$DA_{event} = 2\,FA \times Kp \times Cwat \times CF2 \sqrt{\frac{6T \times ET}{\Pi}}$
											If ET > t*, then
											$DA_{event} = FA \times Kp \times Cwat \times CF2 \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$

				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	1	Best professional judgment	0.5	Best professional judgment	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				τ	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
				EV	Event frequency	event/d	1	Best professional judgment	1	Best professional judgment	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Assumed to be one-half RME	
				SA	Skin surface area	cm2	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
Dermal Contact	Swimmer	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-03	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				τ	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
				EV	Event frequency	event/d	1	Best professional judgment	1	Best professional judgment	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Assumed to be one-half RME	
				SA	Skin surface area	cm2	14,825	Mean value for 7 to <19 years: whole body (USEPA 2011)	14,825	Resident default whole body (USEPA 2014)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed to be one-half RME	
Dermal Contact	Boater	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	2.0	Best professional judgment	1.5	Best professional judgment	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				τ	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
				EV	Event frequency	event/d	1	Best professional judgment	1	Best professional judgment	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				EF	Exposure frequency	d/yr	98	7 days/week for 14 weeks	70	5 days/wk for 14 weeks	
				SA	Skin surface area	cm2	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

TABLE 4-9
RAGS PART D TABLE 4.8: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR ADOLESCENT WADER, SWIMMER AND BOATER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer, Boater - Adolescent
Receptor Age: 7-<19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.
Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

References

USEPA 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Memorandum from: Dana Stalcup, Acting Director, Assessment and Remediation Division, Office of Superfund Remediation and Technology Innovation; To: Superfund National Policy Managers, Regions 1 -10. OSWER Directive 9200.1-120. Feb 6.
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USEPA 1989. Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

TABLE 4-10
RAGS PART D TABLE 4.9: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR CHILD WADER AND SWIMMER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer - Child
Receptor Age: 1-<7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Wader	Child	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	Cs x EF x ED x RBA x IRsed x FI x CF2
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA	Chemical-specific	USEPA 2012b, USEPA	AT x BW
				IRsed	Ingestion rate of sediment	mg/d	100	50% of the default residential child soil IR (USEPA 2014)	50	Assumed to be one-half RME	Arsenic RBA is 0.6; RBA for other chemicals is 1 (USEPA 2012b, USEPA)
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
Incidental Ingestion	Swimmer	Child	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				RBA	Relative bioavailability factor	unitless	Chemical-specific	USEPA 2012b, USEPA	Chemical-specific	USEPA 2012b, USEPA	
				IRsed	Ingestion rate of sediment	mg/d	100	50% of the default residential child soil IR (USEPA 2014)	50	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
Dermal Contact	Wader	Child	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	Cs x EF x ED x SA x AF x ABS x FI x CF2
				SA	Skin surface area	cm2/d	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	AT x BW
				AF	Adherence factor	mg/cm2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	Assumes 1 dermal event per exposure day
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
Dermal Contact	Swimmer	Child	Sediment	Cs	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				SA	Skin surface area	cm2/d	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
				AF	Adherence factor	mg/cm2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
				ABSd	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	

TABLE 4-10
RAGS PART D TABLE 4.9: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR CHILD WADER AND SWIMMER RECEPTORS - SEDIMENT - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Receptor Population: Wader, Swimmer - Child
Receptor Age: 1-<7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions
cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

References

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TABLE 4-11
RAGS PART D TABLE 4.10: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR CHILD WADER AND SWIMMER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer - Child
Receptor Age: 1-<7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Wader	Child	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	$\frac{\text{Cwat x ET x EF x ED X IRwat x FI}}{\text{AT x BW x CF4}}$
				IRwat	Ingestion rate of surface water	L/hr	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	
				ET	Exposure Time	hr/day	1	Best professional judgment	0.5	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	25,550	70-yr lifetime x 365 d/yr (USEPA, 1989)	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
Incidental Ingestion	Swimmer	Child	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				IRwat	Ingestion rate of surface water	L/hr	0.05	Mean swimming rate for children 6-15 yrs (USEPA 2011)	0.05	Mean swimming rate for children 6-15 yrs (USEPA 2011)	
				ET	Exposure Time	hr/d	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	

TABLE 4-11
RAGS PART D TABLE 4.10: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR CHILD WADER AND SWIMMER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer - Child
Receptor Age: 1-<7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Wader	Child	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	DAD = dermally absorbed dose (mg/kg-day)
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	$Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
				ET	Exposure time	hr/d	1	Best professional judgment	0.5	Best professional judgment	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				T	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent for inorganics or highly ionized organics:
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	DAevent = Cwat × Kp × ET × CF2
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	DAevent for organics:
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	If ET ≦ t*, then
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
				EV	Event frequency	event/d	1	USEPA 2004	1	USEPA 2004	$DA_{event} = 2\,FA \times Kp \times Cwat \times CF2 \sqrt{\frac{6T \times ET}{\Pi}}$
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				EF	Exposure frequency	d/yr	13	1 day per week, 3 months/year	7	Assumed to be one-half RME	
				SA	Skin surface area	cm2	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	If ET > t*, then
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	$DA_{event} = FA \times Kp \times Cwat \times CF2 \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
Dermal Contact	Swimmer	Child	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				DAevent	Absorbed dose per event	mg/cm2-event	Calculated value	--	Calculated value	--	
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ET	Exposure time	hr/d	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
				CF2	Conversion Factor	µg/mg, cm3/L	1E-06	--	1E-06	--	
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				T	Lag time per event	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				t*	Time to reach steady-state	hr	Chemical-specific (2.4 x tau_event)	USEPA 2004	Chemical-specific (2.4 x tau_event)	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
				EV	Event frequency	event/d	1	USEPA 2004	1	USEPA 2004	
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				EF	Exposure frequency	d/yr	13	1 day per week, 3 months/year	7	Assumed to be one-half RME	
				SA	Skin surface area	cm2	7,500	Mean value for 1 to <7 years: whole body (USEPA 2011)	7,500	Mean value for 1 to <7 years: whole body (USEPA 2011)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

TABLE 4-11
RAGS PART D TABLE 4.10: VALUES USED FOR DAILY INTAKE CALCULATIONS FOR CHILD WADER AND SWIMMER RECEPTORS - SURFACE WATER - RME AND CTE SCENARIOS
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NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Receptor Population: Wader, Swimmer - Child
Receptor Age: 1-<7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name

This table was originally provided to EPA on November 17, 2016. It is reproduced with minor editorial updates and clarifications, and to reflect comments and revisions provided by USEPA on February 8, 2017, and USEPA review of responses provided April 21, 2017 and July 14, 2017.
The inhalation of outdoor air pathway is evaluated via a screening assessment in Appendix D; based on the findings that the air pathway poses negligible risk, the exposure pathway assumptions have been removed from this table.

Definitions

cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, hr - hour, hr/d - hour per day, hr/event - hour per event,
kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure,
µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

References

USEPA 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. Memorandum from: Dana Stalcup, Acting Director, Assessment and Remediation Division, Office of Superfund Remediation and Technology Innovation; To: Superfund National Policy Managers, Regions 1 -10. OSWER Directive 9200.1-120. Feb 6.

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TABLE 4-12
DEFAULT ABSORPTION FRACTIONS FOR COPCS IN SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern	Oral RBA (unitless) (a)	Dermal ABS (unitless) (b)
Dioxin-like Compounds		
2,3,7,8-TCDD	1	0.03
1,2,3,7,8-PeCDD	1	0.03
1,2,3,4,7,8-HxCDD	1	0.03
1,2,3,6,7,8-HxCDD	1	0.03
1,2,3,7,8,9-HxCDD	1	0.03
1,2,3,4,6,7,8-HpCDD	1	0.03
OCDD	1	0.03
2,3,7,8-TCDF	1	0.03
1,2,3,7,8-PeCDF	1	0.03
2,3,4,7,8-PeCDF	1	0.03
1,2,3,4,7,8-HxCDF	1	0.03
1,2,3,6,7,8-HxCDF	1	0.03
1,2,3,7,8,9-HxCDF	1	0.03
2,3,4,6,7,8-HxCDF	1	0.03
1,2,3,4,6,7,8-HpCDF	1	0.03
1,2,3,4,7,8,9-HpCDF	1	0.03
OCDF	1	0.03
KM TEQ DF	1	0.03
PCB-77	1	0.03
PCB-81	1	0.03
PCB-105	1	0.03
PCB-114	1	0.03
PCB-118	1	0.03
PCB-123	1	0.03
PCB-126	1	0.03
PCB-156/157	1	0.03
PCB-167	1	0.03
PCB-169	1	0.03
PCB-189	1	0.03
KM TEQ PCB	1	0.03
Non-DL PCBs		
Total Non-DL PCBs	1	0.14
PAHs		
Benz(a)anthracene	1	0.13
Benzo(a)pyrene	1	0.13
Benzo(b)fluoranthene	1	0.13
Benzo(k)fluoranthene	1	0.13
Chrysene	1	0.13
Dibenz(a,h)anthracene	1	0.13
Indeno(1,2,3-c,d)-pyrene	1	0.13
Pesticides & Organics		
PHC as gasoline	1	--
TPH (C9-C40)	1	--
Inorganics		
Aluminum	1	--
Antimony	1	--
Arsenic, inorganic	0.6	0.03
Cadmium	1	0.001
Chromium [as Cr(III)]	1	--
Cobalt	1	--
Copper	1	--
Chromium (VI)	1	--
Iron	1	--
Lead	1	--
Manganese	1	--
Mercury	1	--
Nickel	1	--
Thallium	1	--
Vanadium	1	--
Zinc	1	--

Notes
ABS - absorption factor
RBA - relative bioavailability factor
COPC - chemical of potential concern

(a) Oral relative bioavailability is assumed to be 100% (absorption factor = 1) for all chemicals except arsenic; the value for arsenic is 0.6 (60%) (USEPA 2018, 2012, 1989).
(b) Dermal absorption values from USEPA 2004; consistent with the USEPA RSLs (USEPA 2018).

TABLE 4-12
DEFAULT ABSORPTION FRACTIONS FOR COPCS IN SEDIMENT
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern	Oral RBA (unitless) (a)	Dermal ABS (unitless) (b)

References
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TABLE 4-13
DERMAL WATER PARAMETERS FOR COPCS IN SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern	In EPD?	FA (unitless)	B (unitless)	tau event (hr/event)	t* (hr)	Kp (cm/hr)	Type
Dioxin-like Compounds							
2,3,7,8-TCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,7,8-PeCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,4,7,8-HxCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,6,7,8-HxCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,7,8,9-HxCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,4,6,7,8-HpCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
OCDD	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
2,3,7,8-TCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,7,8-PeCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
2,3,4,7,8-PeCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,4,7,8-HxCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,6,7,8-HxCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,7,8,9-HxCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
2,3,4,6,7,8-HxCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,4,6,7,8-HpCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
1,2,3,4,7,8,9-HpCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
OCDF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
KM TEQ DF	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-77	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-81	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-105	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-114	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-118	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-123	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-126	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-156/157	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-167	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-169	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
PCB-189	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
KM TEQ PCB	No	5.0E-01	5.6E+00	6.7E+00	2.9E+01	8.1E-01	O
Non-DL PCBs							
Total Non-DL PCBs	No	5.0E-01	5.2E+00	7.1E+00	3.1E+01	7.5E-01	O
PAHs							
Benz(a)anthracene	No	1.0E+00	3.2E+00	2.0E+00	8.5E+00	5.5E-01	O
Benzo(a)pyrene	No	1.0E+00	4.4E+00	2.7E+00	1.2E+01	7.1E-01	O
Benzo(b)fluoranthene	No	1.0E+00	2.5E+00	2.7E+00	1.1E+01	4.2E-01	O
Benzo(k)fluoranthene	No	9.0E-01	4.2E+00	2.7E+00	1.2E+01	6.9E-01	O
Chrysene	No	1.0E+00	3.5E+00	2.0E+00	8.5E+00	6.0E-01	O
Dibenz(a,h)anthracene	No	6.0E-01	6.1E+00	3.8E+00	1.7E+01	9.5E-01	O
Indeno(1,2,3-c,d)-pyrene	No	6.0E-01	7.9E+00	3.7E+00	1.7E+01	1.2E+00	O
Naphthalene	Yes	1.0E+00	2.0E-01	5.5E-01	1.3E+00	4.7E-02	O
Pesticides & Organics							
2,4'-DDD	Yes	8.0E-01	1.7E+00	6.5E+00	2.6E+01	2.5E-01	O
2,4'-DDE	No	8.0E-01	3.7E+00	6.4E+00	2.7E+01	5.5E-01	O
2,4'-DDT	No	7.0E-01	4.5E+00	1.0E+01	4.4E+01	6.3E-01	O
4,4'-DDD	Yes	8.0E-01	1.7E+00	6.5E+00	2.6E+01	2.5E-01	O
4,4'-DDE	No	8.0E-01	3.7E+00	6.4E+00	2.7E+01	5.5E-01	O
4,4'-DDT	No	7.0E-01	4.5E+00	1.0E+01	4.4E+01	6.3E-01	O
Aldrin	No	1.0E+00	2.2E+00	1.2E+01	4.8E+01	2.9E-01	O
Chloroform	Yes	1.0E+00	2.9E-02	4.9E-01	1.2E+00	6.8E-03	O
Dieldrin	Yes	8.0E-01	2.4E-01	1.4E+01	3.4E+01	3.3E-02	O
Heptachlor	Yes	8.0E-01	1.1E+00	1.3E+01	5.0E+01	1.4E-01	O
Heptachlor epoxide, cis-	Yes	8.0E-01	1.6E-01	1.6E+01	3.8E+01	2.1E-02	O
Hexachlorobenzene	No	9.0E-01	1.6E+00	4.1E+00	1.7E+01	2.5E-01	O
Trichloroethylene	Yes	1.0E+00	5.1E-02	5.7E-01	1.4E+00	1.2E-02	O
Inorganics							
Antimony	Yes	1.0E+00	4.2E-03	5.1E-01	1.2E+00	1.0E-03	I
Arsenic, inorganic	Yes	1.0E+00	3.3E-03	2.8E-01	6.6E-01	1.0E-03	I
Chromium [as Cr(III)]	Yes	1.0E+00	2.8E-03	2.1E-01	4.9E-01	1.0E-03	I
Chromium (VI)	Yes	1.0E+00	5.5E-03	2.1E-01	4.9E-01	2.0E-03	I
Iron	Yes	1.0E+00	2.9E-03	2.2E-01	5.2E-01	1.0E-03	I
Manganese	Yes	1.0E+00	2.9E-03	2.1E-01	5.1E-01	1.0E-03	I
Mercury	Yes	1.0E+00	6.3E-03	3.5E+00	8.4E+00	1.0E-03	I
Thallium	Yes	1.0E+00	5.5E-03	1.5E+00	3.5E+00	1.0E-03	I
Titanium	Yes	1.0E+00	5.3E-03	1.2E+00	2.9E+00	1.0E-03	I

Notes
B - relative contribution of permeability coefficient
COPC - chemical of potential concern
EPD - effective prediction domain
FA - fraction absorbed water
Kp - dermal permeability coefficient of compound in water
t* - time to reach steady-state
tau event - lag time per event

TABLE 4-13
DERMAL WATER PARAMETERS FOR COPCS IN SURFACE WATER
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern	In EPD?	FA (unitless)	B (unitless)	tau event (hr/event)	t* (hr)	Kp (cm/hr)	Type

Parameters are from USEPA 2004; consistent with the USEPA RSLs (USEPA 2018).

References

USEPA. 2018. Regional Screening Levels for Chemical Contaminants at Superfund Sites. November. Avaliable at https://www.epa.gov/risk/regional-screening-levels-rsls

USEPA. 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final, EPA/540/R/99/005, OSWER 7-02EP, PB99-963312. Office of Superfund Remediation and Technology Innovation, Washington, DC. July.

TABLE 4-14
RAGS PART D TABLE 3.1: EXPOSURE POINT CONCENTRATION SUMMARY FOR ACCESSIBLE SEDIMENT - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (6)	Units	Statistic	Rationale
Sediment													
	Dioxin-like Compounds												
	2,3,7,8-TCDD	mg/kg	5.46E-05	(1)	7.65E-05	95% Adjusted Gamma UCL	—	2.71E-04	--	7.65E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,7,8-PeCDD	mg/kg	3.08E-06	(1)	4.02E-06	95% Adjusted Gamma UCL	—	1.38E-05	--	4.02E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,4,7,8-HxCDD	mg/kg	2.80E-06	(1)	3.60E-06	95% Adjusted Gamma UCL	—	1.24E-05	--	3.60E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,6,7,8-HxCDD	mg/kg	1.11E-05	(1)	1.46E-05	95% Adjusted Gamma UCL	—	4.98E-05	--	1.46E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,7,8,9-HxCDD	mg/kg	6.58E-06	(1)	8.59E-06	95% Adjusted Gamma UCL	—	2.74E-05	--	8.59E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,4,6,7,8-HpCDD	mg/kg	1.93E-04	(1)	2.57E-04	95% Adjusted Gamma UCL	—	1.17E-03	J	2.57E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	OCDD	mg/kg	2.00E-03	(1)	2.61E-03	95% Adjusted Gamma UCL	—	1.17E-02	J	2.61E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	2,3,7,8-TCDF	mg/kg	1.06E-05	(1)	1.38E-05	95% Adjusted Gamma UCL	—	5.03E-05	J	1.38E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,7,8-PeCDF	mg/kg	7.14E-06	(1)	9.44E-06	95% Adjusted Gamma UCL	—	3.65E-05	J	9.44E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	2,3,4,7,8-PeCDF	mg/kg	1.21E-05	(1)	1.58E-05	95% Adjusted Gamma UCL	—	4.90E-05	J	1.58E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,4,7,8-HxCDF	mg/kg	5.05E-05	(1)	7.22E-05	95% Adjusted Gamma UCL	—	4.33E-04	J	7.22E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,6,7,8-HxCDF	mg/kg	1.40E-05	(1)	1.88E-05	95% Adjusted Gamma UCL	—	9.52E-05	J	1.88E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,7,8,9-HxCDF	mg/kg	1.06E-06	(2)	1.41E-06	95% KM (t) UCL	—	4.86E-06	J	1.41E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	2,3,4,6,7,8-HxCDF	mg/kg	7.99E-06	(1)	1.05E-05	95% Adjusted Gamma UCL	—	3.83E-05	J	1.05E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,4,6,7,8-HpCDF	mg/kg	2.30E-04	(1)	3.20E-04	95% Adjusted Gamma UCL	—	1.88E-03	J	3.20E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	1,2,3,4,7,8,9-HpCDF	mg/kg	8.23E-06	(1)	1.09E-05	95% Adjusted Gamma UCL	—	3.71E-05	J	1.09E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	OCDF	mg/kg	3.26E-04	(1)	4.47E-04	95% Adjusted Gamma UCL	—	2.66E-03	J	4.47E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	KM TEQ DF	mg/kg	7.66E-05	(1)	1.04E-04	95% Adjusted Gamma UCL	—	3.53E-04	--	1.04E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	PCB-77	mg/kg	2.87E-03	(1)	7.72E-03	95% Chebyshev (Mean, Sd) UCL	(3)	4.34E-02	J	7.72E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	PCB-81	mg/kg	1.24E-04	(2)	2.97E-04	95% KM (Chebyshev) UCL	—	1.54E-03	--	2.97E-04	mg/kg	95% KM (Chebyshev) UCL	95% UCL less than maximum
	PCB-105	mg/kg	7.25E-03	(2)	1.24E-02	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	—	6.77E-02	J	1.24E-02	mg/kg	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	95% UCL less than maximum
	PCB-114	mg/kg	3.96E-04	(2)	8.51E-04	95% KM (Chebyshev) UCL	(3)	3.38E-03	--	8.51E-04	mg/kg	95% KM (Chebyshev) UCL	95% UCL less than maximum
	PCB-118	mg/kg	1.77E-02	(1)	3.62E-02	95% Chebyshev (Mean, Sd) UCL	(3)	1.28E-01	J	3.62E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	PCB-123	mg/kg	4.66E-04	(2)	1.05E-03	95% KM (Chebyshev) UCL	(3)	4.75E-03	--	1.05E-03	mg/kg	95% KM (Chebyshev) UCL	95% UCL less than maximum
	PCB-126	mg/kg	1.18E-04	(2)	2.45E-04	95% KM (Chebyshev) UCL	(3)	1.10E-03	--	2.45E-04	mg/kg	95% KM (Chebyshev) UCL	95% UCL less than maximum
	PCB-156/157	mg/kg	2.27E-03	(1)	3.24E-03	95% Adjusted Gamma UCL	—	1.25E-02	--	3.24E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	PCB-167	mg/kg	7.74E-04	(2)	1.16E-03	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	—	4.16E-03	--	1.16E-03	mg/kg	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	95% UCL less than maximum
	PCB-169	mg/kg	—	(0)	—	—	(0)	2.52E-04	U	2.52E-04	mg/kg	Maximum	Maximum used because 95% UCL not available
	PCB-189	mg/kg	1.81E-04	(2)	4.19E-03	95% GROS Adjusted Gamma UCL	(4)	8.11E-04	--	8.11E-04	mg/kg	Maximum	Maximum less than 95% UCL
	KM TEQ PCB	mg/kg	1.77E-05	(1)	3.05E-05	95% Chebyshev (Mean, Sd) UCL	(3)	1.22E-04	--	3.05E-05	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Non-DL PCBs												
	Total Non-DL PCBs	mg/kg	4.75E-01	(1)	6.60E-01	95% Adjusted Gamma UCL	—	3.74E+00	J	6.60E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	PAHs												
	Benz(a)anthracene	mg/kg	1.00E+00	(1)	2.09E+00	95% Chebyshev (Mean, Sd) UCL	(3)	7.70E+00	--	2.09E+00	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Benzo(a)pyrene	mg/kg	1.08E+00	(1)	2.04E+00	95% Chebyshev (Mean, Sd) UCL	(3)	6.60E+00	--	2.04E+00	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Benzo(b)fluoranthene	mg/kg	9.79E-01	(1)	1.83E+00	95% Chebyshev (Mean, Sd) UCL	(3)	6.40E+00	--	1.83E+00	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Benzo(k)fluoranthene	mg/kg	8.96E-01	(1)	1.19E+00	95% Adjusted Gamma UCL	—	5.40E+00	--	1.19E+00	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Chrysene	mg/kg	9.98E-01	(1)	2.00E+00	95% Chebyshev (Mean, Sd) UCL	(3)	6.90E+00	--	2.00E+00	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Dibenz(a,h)anthracene	mg/kg	2.22E-01	(1)	4.20E-01	95% Chebyshev (Mean, Sd) UCL	(3)	1.40E+00	--	4.20E-01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Indeno(1,2,3-c,d)-pyrene	mg/kg	5.64E-01	(1)	7.56E-01	95% Adjusted Gamma UCL	—	3.90E+00	--	7.56E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Pesticides & Organics												
	PHC as gasoline	mg/kg	2.70E+00	(2)	5.66E+00	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	—	3.70E+01	--	5.66E+00	mg/kg	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	95% UCL less than maximum
	TPH (C9-C40)	mg/kg	2.94E+02	(2)	4.11E+02	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	—	1.29E+03	J	4.11E+02	mg/kg	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	95% UCL less than maximum
	Inorganics												
	Aluminum	mg/kg	1.08E+04	(1)	1.22E+04	95% Modified-t UCL	(5)	2.33E+04	J	1.22E+04	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Antimony	mg/kg	1.18E+00	(2)	2.34E+00	95% KM (Chebyshev) UCL	—	7.79E+00	--	2.34E+00	mg/kg	95% KM (Chebyshev) UCL	95% UCL less than maximum
	Arsenic, inorganic	mg/kg	1.62E+01	(1)	3.07E+01	95% Chebyshev (Mean, Sd) UCL	—	1.15E+02	--	3.07E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Cadmium	mg/kg	1.53E+00	(1)	3.08E+00	95% Chebyshev (Mean, Sd) UCL	(3)	1.37E+01	--	3.08E+00	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Chromium [as Cr(III)]	mg/kg	8.87E+01	(1)	1.08E+02	95% Adjusted Gamma UCL	—	2.80E+02	J	1.08E+02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum

TABLE 4-14
RAGS PART D TABLE 3.1: EXPOSURE POINT CONCENTRATION SUMMARY FOR ACCESSIBLE SEDIMENT - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (6)	Units	Statistic	Rationale
Sediment													
	Cobalt	mg/kg	9.58E+00	(1)	1.41E+01	95% Chebyshev (Mean, Sd) UCL	(3)	3.74E+01	J	1.41E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Copper	mg/kg	1.32E+02	(1)	1.67E+02	95% Adjusted Gamma UCL	—	4.43E+02	--	1.67E+02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Chromium (VI)	mg/kg	9.14E-01	(2)	1.39E+00	95% KM (t) UCL	—	8.00E+00	--	1.39E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Iron	mg/kg	2.64E+04	(1)	4.34E+04	95% Chebyshev (Mean, Sd) UCL	—	1.48E+05	--	4.34E+04	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Lead	mg/kg	2.06E+02	(1)	4.69E+02	95% Chebyshev (Mean, Sd) UCL	(3)	2.19E+03	--	4.69E+02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Manganese	mg/kg	2.56E+02	(1)	3.54E+02	95% Chebyshev (Mean, Sd) UCL	(3)	5.89E+02	J	3.54E+02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Mercury	mg/kg	1.54E+00	(1)	1.99E+00	95% Adjusted Gamma UCL	—	7.39E+00	--	1.99E+00	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Nickel	mg/kg	4.17E+01	(1)	6.72E+01	95% Chebyshev (Mean, Sd) UCL	—	1.82E+02	J	6.72E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Thallium	mg/kg	2.07E-01	(1)	2.45E-01	95% Adjusted Gamma UCL	—	7.17E-01	J	2.45E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Vanadium	mg/kg	3.35E+01	(1)	5.00E+01	95% Chebyshev (Mean, Sd) UCL	(3)	1.42E+02	--	5.00E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Zinc	mg/kg	4.62E+02	(1)	1.24E+03	95% Chebyshev (Mean, Sd) UCL	—	6.81E+03	J	1.24E+03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum

Definitions

CTE - central tendency exposure, DF - dioxin/furan, J - estimated value, KM - Kaplan-Meier, mgkg - milligram per kilogram, NDL-PCB - nondioxin-like PCB, PCB - polychlorinated biphenyl, RME - reasonable maximum exposure, TEQ - toxicity equivalence,
U - not detected, UCL - upper confidence limit on the mean

Notes

Statistics were calculated using ProUCL version 5.1.
(0) Mean and 95% UCL could not be calculated because there was only one distinct detected value.
(1) Arithmetic mean reported because detection frequency was 100%.
(2) Kaplan-Meier mean reported because detection frequency was less than 100% but not 0%.
(3) ProUCL's maximum suggested UCL was an H-UCL. The 95% Chebyshev UCL was substituted.
(4) ProUCL suggested more than one 95% UCL distribution; the greatest of the suggested 95% UCL values is reported here.
(5) ProUCL's maximum suggested UCL was an H-UCL. The second-greatest suggested UCL was substituted.
(6) Consistent with risk assessment guidance, the exposure point concentration used to evaluate RME is also used to evaluate CTE.

TABLE 4-15
RAGS PART D TABLE 3.2: EXPOSURE POINT CONCENTRATION SUMMARY FOR SURFACE WATER - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (12)	Units	Statistic	Rationale
Surface Water													
	Dioxin-like Compounds												
	2,3,7,8-TCDD	µg/L	1.06E-06	(4)	1.22E-06	95% KM (t) UCL	--	5.31E-06	J	1.22E-06	µg/L	95% KM (t) UCL	95% UCL less than maximum
	1,2,3,7,8-PeCDD	µg/L	3.80E-07	(4)	4.23E-07	95% KM (t) UCL	(9)	3.62E-06	U	4.23E-07	µg/L	95% KM (t) UCL	95% UCL less than maximum
	1,2,3,4,7,8-HxCDD	µg/L	(1)	(1)	(1)	(1)	(1)	3.07E-06	U	3.07E-06	µg/L	Maximum	Maximum used because 95% UCL not available
	1,2,3,6,7,8-HxCDD	µg/L	4.40E-07	(4)	4.92E-07	95% KM (t) UCL	--	3.18E-06	U	4.92E-07	µg/L	95% KM (t) UCL	95% UCL less than maximum
	1,2,3,7,8,9-HxCDD	µg/L	8.01E-07	(4)	8.67E-07	95% KM (t) UCL	--	3.61E-06	U	8.67E-07	µg/L	95% KM (t) UCL	95% UCL less than maximum
	1,2,3,4,6,7,8-HpCDD	µg/L	4.71E-06	(4)	6.20E-06	95% KM Chebyshev UCL	(6)	1.66E-05	J	6.20E-06	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	OCDD	µg/L	5.82E-05	(4)	6.48E-05	95% KM Approximate Gamma UCL	(11)	1.94E-04	--	6.48E-05	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	2,3,7,8-TCDF	µg/L	3.20E-07	(4)	4.76E-07	95% KM Chebyshev UCL	--	2.73E-06	J	4.76E-07	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	1,2,3,7,8-PeCDF	µg/L	2.77E-07	(4)	3.80E-07	95% KM Chebyshev UCL	--	2.50E-06	U	3.80E-07	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	2,3,4,7,8-PeCDF	µg/L	3.81E-07	(4)	6.59E-07	95% KM Chebyshev UCL	(6)	6.46E-06	J	6.59E-07	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	1,2,3,4,7,8-HxCDF	µg/L	1.28E-06	(4)	1.83E-06	95% KM Chebyshev UCL	(6)	8.01E-06	J	1.83E-06	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	1,2,3,6,7,8-HxCDF	µg/L	3.85E-07	(4)	4.43E-07	95% KM (t) UCL	--	2.17E-06	U	4.43E-07	µg/L	95% KM (t) UCL	95% UCL less than maximum
	1,2,3,7,8,9-HxCDF	µg/L	(2)	(2)	(2)	(2)	(2)	2.64E-06	U	2.64E-06	µg/L	Maximum	Maximum used because 95% UCL not available
	2,3,4,6,7,8-HxCDF	µg/L	2.41E-07	(4)	2.81E-07	95% KM Approximate Gamma UCL	(9)	3.61E-06	U	2.81E-07	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	1,2,3,4,6,7,8-HpCDF	µg/L	5.38E-06	(4)	7.75E-06	95% KM Chebyshev UCL	(6)	4.40E-05	--	7.75E-06	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	1,2,3,4,7,8,9-HpCDF	µg/L	4.34E-07	(4)	4.88E-07	95% KM (t) UCL	--	3.46E-06	U	4.88E-07	µg/L	95% KM (t) UCL	95% UCL less than maximum
	OCDF	µg/L	9.24E-06	(4)	1.45E-05	95% KM Chebyshev UCL	(6)	1.15E-04	--	1.45E-05	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	KM TEQ DF	µg/L	2.22E-06	(3)	2.44E-06	95% Modified-t UCL	(9)	7.30E-06	J	2.44E-06	µg/L	95% Modified-t UCL	95% UCL less than maximum
	PCB-77	µg/L	1.90E-05	(4)	2.06E-05	95% KM (t) UCL	(5)	6.06E-05	--	2.06E-05	µg/L	95% KM (t) UCL	95% UCL less than maximum
	PCB-81	µg/L	6.19E-07	(4)	6.84E-07	95% KM Approximate Gamma UCL	(9)	1.31E-05	U	6.84E-07	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	PCB-105	µg/L	5.95E-05	(4)	7.33E-05	95% KM Chebyshev UCL	(6)	1.80E-04	--	7.33E-05	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	PCB-114	µg/L	2.92E-06	(4)	3.81E-06	95% KM Chebyshev UCL	(6)	1.24E-05	J	3.81E-06	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	PCB-118	µg/L	1.51E-04	(3)	1.64E-04	95% Modified-t UCL	(9)	4.28E-04	--	1.64E-04	µg/L	95% Modified-t UCL	95% UCL less than maximum
	PCB-123	µg/L	2.81E-06	(4)	3.17E-06	95% KM Approximate Gamma UCL	(9)	1.29E-05	J	3.17E-06	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	PCB-126	µg/L	5.80E-07	(4)	6.74E-07	95% KM Approximate Gamma UCL	(9)	1.13E-05	U	6.74E-07	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	PCB-156/157	µg/L	1.54E-05	(4)	1.94E-05	95% KM Chebyshev UCL	--	4.95E-05	--	1.94E-05	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	PCB-167	µg/L	5.22E-06	(4)	6.55E-06	95% KM Chebyshev UCL	(6)	1.71E-05	J	6.55E-06	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	PCB-169	µg/L	3.44E-07	(4)	4.03E-07	95% KM Chebyshev UCL	--	1.24E-05	U	4.03E-07	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	PCB-189	µg/L	7.22E-07	(4)	8.57E-07	95% KM Approximate Gamma UCL	(9)	1.56E-05	U	8.57E-07	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	KM TEQ PCB	µg/L	9.98E-08	(3)	1.09E-07	95% Student's-t UCL	(9)	5.52E-07	J	1.09E-07	µg/L	95% Student's-t UCL	95% UCL less than maximum
	Non-DL PCBs												
	Total Non-DL PCBs	µg/L	6.77E-03	(3)	7.22E-03	95% Approximate Gamma UCL	--	1.51E-02	J	7.22E-03	µg/L	95% Approximate Gamma UCL	95% UCL less than maximum
	PAHs												
	Benz(a)anthracene	µg/L	8.13E-03	(4)	1.18E-02	95% KM Chebyshev UCL	--	2.00E-01	U	1.18E-02	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Benzo(a)pyrene	µg/L	1.06E-02	(4)	1.52E-02	95% KM Chebyshev UCL	(6)	2.00E-01	U	1.52E-02	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Benzo(b)fluoranthene	µg/L	1.46E-02	(4)	2.06E-02	95% KM Chebyshev UCL	(6)	2.00E-01	U	2.06E-02	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Benzo(k)fluoranthene	µg/L	6.54E-03	(4)	9.21E-03	95% KM Chebyshev UCL	--	2.00E-01	U	9.21E-03	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Chrysene	µg/L	1.47E-02	(4)	2.02E-02	95% KM Chebyshev UCL	--	2.00E-01	U	2.02E-02	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Dibenz(a,h)anthracene	µg/L	2.40E-03	(4)	3.90E-03	95% KM Chebyshev UCL	--	2.00E-01	U	3.90E-03	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Indeno(1,2,3-c,d)-pyrene	µg/L	7.39E-03	(4)	8.65E-03	95% KM Approximate Gamma UCL	(9)	2.00E-01	U	8.65E-03	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	Naphthalene	µg/L	3.21E-02	(4)	3.55E-02	95% KM (t) UCL	--	2.00E-01	U	3.55E-02	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Pesticides & Organics												
	2,4'-DDD	µg/L	1.21E-04	(4)	1.34E-04	95% KM (t) UCL	(5)	3.30E-04	J	1.34E-04	µg/L	95% KM (t) UCL	95% UCL less than maximum
	2,4'-DDE	µg/L	6.89E-05	(4)	7.95E-05	95% KM Approximate Gamma UCL	(9)	4.91E-04	U	7.95E-05	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	2,4'-DDT	µg/L	2.53E-05	(4)	2.95E-05	95% KM (t) UCL	--	4.10E-04	U	2.95E-05	µg/L	95% KM (t) UCL	95% UCL less than maximum
	4,4'-DDD	µg/L	3.25E-04	(4)	3.54E-04	95% KM (t) UCL	(5)	9.00E-04	--	3.54E-04	µg/L	95% KM (t) UCL	95% UCL less than maximum
	4,4'-DDE	µg/L	3.07E-04	(4)	3.46E-04	95% KM (t) UCL	(5)	1.20E-03	--	3.46E-04	µg/L	95% KM (t) UCL	95% UCL less than maximum
	4,4'-DDT	µg/L	9.17E-05	(4)	1.41E-04	95% KM Chebyshev UCL	--	6.40E-04	--	1.41E-04	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Aldrin	µg/L	7.27E-06	(4)	9.48E-06	95% KM (t) UCL	--	4.10E-04	U	9.48E-06	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Chloroform	µg/L	1.14E-01	(4)	1.20E-01	95% KM (t) UCL	(9)	5.00E-01	U	1.20E-01	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Dieldrin	µg/L	3.55E-04	(4)	3.87E-04	95% KM (t) UCL	(9)	9.87E-04	--	3.87E-04	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Heptachlor	µg/L	8.80E-06	(4)	1.81E-05	95% KM Chebyshev UCL	--	4.10E-04	U	1.81E-05	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Heptachlor epoxide, cis-	µg/L	1.58E-04	(4)	1.77E-04	95% KM Approximate Gamma UCL	(9)	4.74E-04	--	1.77E-04	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum
	Hexachlorobenzene	µg/L	4.35E-05	(4)	5.19E-05	95% KM (t) UCL	--	5.10E-04	U	5.19E-05	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Trichloroethylene	µg/L	1.25E-01	(4)	1.31E-01	95% KM (t) UCL	(9)	5.00E-01	U	1.31E-01	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Inorganics												
	Antimony	µg/L	6.30E-01	(4)	6.98E-01	95% KM (t) UCL	--	1.35E+00	--	6.98E-01	µg/L	95% KM (t) UCL	95% UCL less than maximum
	Arsenic, inorganic	µg/L	1.22E+00	(3)	1.27E+00	95% Modified-t UCL	(9)	1.84E+00	--	1.27E+00	µg/L	95% Modified-t UCL	95% UCL less than maximum
	Chromium [as Cr(III)]	µg/L	1.14E+00	(3)	1.29E+00	95% Modified-t UCL	(9)	5.61E+00	--	1.29E+00	µg/L	95% Modified-t UCL	95% UCL less than maximum
	Chromium (VI)	µg/L	1.29E-01	(4)	2.23E-01	95% KM Chebyshev UCL	(6)	1.19E+00	U	2.23E-01	µg/L	95% KM Chebyshev UCL	95% UCL less than maximum
	Iron	µg/L	3.75E+02	(3)	5.33E+02	95% Chebyshev (Mean, Sd) UCL	--	2.32E+03	--	5.33E+02	µg/L	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Manganese	µg/L	6.50E+01	(3)	6.91E+01	95% Modified-t UCL	(5)	1.17E+02	--	6.91E+01	µg/L	95% Modified-t UCL	95% UCL less than maximum
	Mercury	µg/L	2.06E-02	(3)	2.64E-02	95% Chebyshev (Mean, Sd) UCL	--	7.63E-02	--	2.64E-02	µg/L	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Thallium	µg/L	1.08E-02	(4)	1.24E-02	95% KM (BCA) UCL	(9)	4.80E-02	--	1.24E-02	µg/L	95% KM (BCA) UCL	95% UCL less than maximum
	Titanium	µg/L	6.55E+00	(4)	7.92E+00	95% KM Approximate Gamma UCL	(11)	4.33E+01	J	7.92E+00	µg/L	95% KM Approximate Gamma UCL	95% UCL less than maximum

TABLE 4-15
RAGS PART D TABLE 3.2: EXPOSURE POINT CONCENTRATION SUMMARY FOR SURFACE WATER - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration			
										Value (12)	Units	Statistic	Rationale

Definitions
CTE - central tendency exposure, DF - dioxin/furan, J - estimated value, KM - Kaplan-Meier, NDL-PCB - nondioxin-like PCB, PCB - polychlorinated biphenyl, RME - reasonable maximum exposure, TEQ - toxicity equivalence,
U - not detected, UCL - upper confidence limit on the mean, µg/L - microgram per liter

Notes
Statistics were calculated using ProUCL version 5.1.
(1) Mean and 95% UCL could not be calculated because all samples were non-detects.
(2) Mean and 95% UCL could not be calculated because there were not enough distinct detected values.
(3) Arithmetic mean reported because detection frequency was 100%.
(4) Kaplan-Meier mean reported because detection frequency was less than 100%, but (1) and (2) did not apply.
(5) ProUCL's maximum suggested UCL was an H-UCL. The second-greatest suggested UCL was substituted.
(6) ProUCL's maximum suggested UCL was an H-UCL. The 95% Chebyshev UCL was substituted.
(7) ProUCL's maximum suggested UCL was a 99% UCL. The 95% Chebyshev UCL was substituted.
(8) ProUCL's suggested UCL was missing (95% Adjusted Gamma UCL). 95% Chebyshev UCL was substituted.
(9) ProUCL suggested more than one 95% UCL distribution; the greatest of the suggested 95% UCL values is reported here.
(10) ProUCL's recommendation was for the 95% confidence coefficient only. 95% Chebyshev UCL was substituted.
(11) ProUC's maximum suggested UCL was a GROS Approximate Gamma UCL. The second-greatest suggested UCL was substituted.

TABLE 4-16
RAGS PART D TABLE 3.3: EXPOSURE POINT CONCENTRATION SUMMARY FOR FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (11)	Exposure Point Concentration Units	Exposure Point Concentration Statistic	Exposure Point Concentration Rationale
Biota																
	Dioxin-like Compounds															
	Fish	Fillet	American Eel	2,3,7,8-TCDD	mg/kg	7.03E-06	(4)	8.77E-06	95% KM (t) UCL	--	1.47E-05	--	8.77E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,7,8-PeCDD	mg/kg	5.42E-07	(4)	7.01E-07	95% KM (t) UCL	--	1.26E-06	J	7.01E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,4,7,8-HxCDD	mg/kg	2.78E-07	(4)	4.18E-07	95% KM Adjusted Gamma UCL	(6)	9.32E-07	J	4.18E-07	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,6,7,8-HxCDD	mg/kg	1.38E-06	(3)	1.89E-06	95% Adjusted Gamma UCL	--	3.76E-06	J	1.89E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,7,8,9-HxCDD	mg/kg	2.44E-07	(3)	3.46E-07	95% Adjusted Gamma UCL	--	7.60E-07	J	3.46E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,4,6,7,8-HpCDD	mg/kg	9.68E-07	(3)	1.29E-06	95% Student's-t UCL	--	2.85E-06	J	1.29E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	OCDD	mg/kg	1.99E-06	(3)	3.17E-06	95% Adjusted Gamma UCL	--	1.23E-05	J	3.17E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	2,3,7,8-TCDF	mg/kg	8.06E-08	(4)	1.05E-07	95% KM (t) UCL	--	2.61E-07	U	1.05E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,7,8-PeCDF	mg/kg	1.05E-06	(4)	1.40E-06	95% KM (t) UCL	--	3.25E-06	J	1.40E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	2,3,4,7,8-PeCDF	mg/kg	2.71E-06	(3)	3.85E-06	95% Adjusted Gamma UCL	--	9.23E-06	J	3.85E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,4,7,8-HxCDF	mg/kg	1.85E-06	(3)	2.69E-06	95% Adjusted Gamma UCL	--	4.71E-06	J	2.69E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,6,7,8-HxCDF	mg/kg	1.64E-06	(3)	2.02E-06	95% Student's-t UCL	--	3.85E-06	J	2.02E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,7,8,9-HxCDF	mg/kg	9.30E-08	(4)	1.14E-07	95% KM (t) UCL	--	2.54E-07	J	1.14E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	2,3,4,6,7,8-HxCDF	mg/kg	2.91E-07	(3)	3.63E-07	95% Student's-t UCL	--	6.30E-07	J	3.63E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,4,6,7,8-HpCDF	mg/kg	3.77E-06	(3)	4.75E-06	95% Student's-t UCL	--	8.58E-06	J	4.75E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	1,2,3,4,7,8,9-HpCDF	mg/kg	1.30E-07	(4)	1.61E-07	95% KM (t) UCL	--	2.62E-07	J	1.61E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	OCDF	mg/kg	2.90E-07	(3)	3.60E-07	95% Student's-t UCL	--	6.77E-07	J	3.60E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	KM TEQ DF	mg/kg	9.03E-06	(3)	1.12E-05	95% Student's-t UCL	--	1.96E-05	--	1.12E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-77	mg/kg	5.96E-05	(3)	7.49E-05	95% Student's-t UCL	--	1.40E-04	--	7.49E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-81	mg/kg	6.63E-06	(4)	1.17E-05	95% KM (t) UCL	--	3.47E-05	--	1.17E-05	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-105	mg/kg	1.67E-02	(3)	2.07E-02	95% Student's-t UCL	--	4.02E-02	J	2.07E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-114	mg/kg	1.06E-03	(3)	1.32E-03	95% Student's-t UCL	--	2.52E-03	--	1.32E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-118	mg/kg	5.77E-02	(3)	7.11E-02	95% Student's-t UCL	--	1.27E-01	J	7.11E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-123	mg/kg	1.14E-03	(3)	1.41E-03	95% Student's-t UCL	--	2.28E-03	J	1.41E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-126	mg/kg	5.42E-05	(4)	1.19E-04	95% KM (t) UCL	--	5.19E-04	--	1.19E-04	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-156/157	mg/kg	4.93E-03	(3)	6.20E-03	95% Student's-t UCL	--	1.09E-02	J	6.20E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-167	mg/kg	2.12E-03	(3)	2.70E-03	95% Student's-t UCL	--	4.73E-03	J	2.70E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-169	mg/kg	2.01E-06	(4)	4.36E-06	95% KM Chebyshev UCL	--	7.94E-06	J	4.36E-06	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	PCB-189	mg/kg	4.08E-04	(3)	4.83E-04	95% Student's-t UCL	--	8.05E-04	J	4.83E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	KM TEQ PCB	mg/kg	7.61E-06	(3)	2.16E-05	95% Chebyshev (Mean, Sd) UCL	--	5.51E-05	--	2.16E-05	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Non-DL PCBs															
	Fish	Fillet	American Eel	Total Non-DL PCBs	mg/kg	4.99E-01	(3)	5.91E-01	95% Student's-t UCL	--	9.69E-01	J	5.91E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	PAHs															
	Fish	Fillet	American Eel	Benz(a)anthracene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Benzo(a)pyrene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Benzo(b)fluoranthene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Chrysene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Dibenz(a,h)anthracene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Indeno(1,2,3-c,d)-pyrene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Pesticides & Organics															
	Fish	Fillet	American Eel	2,4'-DDD	mg/kg	2.12E-03	(3)	3.07E-03	95% Adjusted Gamma UCL	--	7.89E-03	J	3.07E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	2,4'-DDE	mg/kg	1.09E-03	(3)	1.97E-03	95% Chebyshev (Mean, Sd) UCL	(7)	2.72E-03	--	1.97E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	2,4'-DDT	mg/kg	2.44E-04	(3)	3.58E-04	95% Adjusted Gamma UCL	--	6.68E-04	--	3.58E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	4,4'-DDD	mg/kg	1.00E-01	(3)	1.31E-01	95% Student's-t UCL	--	2.90E-01	J	1.31E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	4,4'-DDE	mg/kg	2.16E-01	(3)	2.79E-01	95% Student's-t UCL	--	6.79E-01	J	2.79E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	4,4'-DDT	mg/kg	5.58E-03	(3)	7.69E-03	95% Student's-t UCL	--	1.68E-02	--	7.69E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Benzaldehyde	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Chlordane, alpha (cis)	mg/kg	1.15E-02	(3)	1.40E-02	95% Student's-t UCL	--	2.08E-02	--	1.40E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Chlordane, gamma (trans)	mg/kg	3.14E-03	(3)	3.89E-03	95% Student's-t UCL	--	7.10E-03	J	3.89E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Dieldrin	mg/kg	1.17E-02	(3)	1.43E-02	95% Student's-t UCL	--	2.17E-02	--	1.43E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Heptachlor epoxide, cis-	mg/kg	3.04E-03	(3)	3.75E-03	95% Student's-t UCL	--	6.34E-03	J	3.75E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Heptachlor epoxide, trans-	mg/kg	1.53E-04	(4)	3.81E-04	95% KM (t) UCL	(10)	1.45E-03	J	3.81E-04	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Hexachlorobenzene	mg/kg	3.36E-03	(3)	4.07E-03	95% Student's-t UCL	--	6.59E-03	J	4.07E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Mirex	mg/kg	3.56E-04	(3)	4.18E-04	95% Student's-t UCL	--	5.74E-04	J	4.18E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Nonachlor, cis-	mg/kg	8.93E-03	(3)	1.08E-02	95% Student's-t UCL	--	1.76E-02	J	1.08E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Nonachlor, trans-	mg/kg	2.13E-02	(3)	2.62E-02	95% Student's-t UCL	--	5.31E-02	J	2.62E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Oxychlordane	mg/kg	1.16E-02	(3)	1.43E-02	95% Student's-t UCL	--	2.87E-02	J	1.43E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Pyridine	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Inorganics															
	Fish	Fillet	American Eel	Aluminum	mg/kg	--	(2)	--	--	(2)	6.27E+00	J	6.27E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Arsenic, organic	mg/kg	9.17E-01	(3)	1.07E+00	95% Modified-t UCL	(5)	1.76E+00	--	1.07E+00	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Arsenic, inorganic	mg/kg	1.02E-01	(3)	1.19E-01	95% Student's-t UCL	(5)	1.96E-01	--	1.19E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Cadmium	mg/kg	--	(1)	--	--	(1)	4.55E-02	U	4.55E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Chromium [as Cr(III)]	mg/kg	--	(2)	--	--	(2)	2.42E+00	--	2.42E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Cobalt	mg/kg	2.88E-03	(4)	7.00E-03	95% KM (t) UCL	--	2.86E-02	J	7.00E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Copper	mg/kg	1.69E-01	(4)	2.10E-01	95% KM (t) UCL	--	3.23E-01	J	2.10E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Iron	mg/kg	4.88E+00	(4)	7.54E+00	95% KM Adjusted Gamma UCL	(6)	2.14E+01	--	7.54E+00	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Lead	mg/kg	2.07E-02	(4)	2.30E-02	95% KM (t) UCL	--	3.39E-02	J	2.30E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Manganese	mg/kg	2.56E-01	(4)	3.40E-01	95% KM (t) UCL	--	6.99E-01	--	3.40E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Mercury	mg/kg	3.56E-01	(3)	4.19E-01	95% Student's-t UCL	--	6.38E-01	--	4.19E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Methyl Mercury	mg/kg	3.88E-01	(3)	4.59E-01	95% Student's-t UCL	--	7.64E-01	--	4.59E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Selenium	mg/kg	4.65E-01	(3)	5.13E-01	95% Student's-t UCL	--	8.48E-01	--	5.13E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum

TABLE 4-16
RAGS PART D TABLE 3.3: EXPOSURE POINT CONCENTRATION SUMMARY FOR FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (11)	Exposure Point Concentration Units	Exposure Point Concentration Statistic	Exposure Point Concentration Rationale
Biota																
	Fish	Fillet	American Eel	Silver	mg/kg	--	(1)	--	--	(1)	1.98E-02	U	1.98E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	American Eel	Vanadium	mg/kg	2.12E-02	(4)	2.27E-02	95% KM (t) UCL	(10)	3.17E-02	J	2.27E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	American Eel	Zinc	mg/kg	2.64E+01	(3)	2.93E+01	95% Student's-t UCL	--	4.31E+01	--	2.93E+01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Dioxin-like Compounds															
	Fish	Fillet	Bluefish	2,3,7,8-TCDD	mg/kg	9.63E-07	(3)	1.48E-06	95% Adjusted Gamma UCL	--	3.19E-06	--	1.48E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,7,8-PeCDD	mg/kg	2.24E-07	(4)	2.97E-07	95% KM (t) UCL	--	5.75E-07	J	2.97E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,4,7,8-HxCDD	mg/kg	5.71E-08	(4)	7.27E-08	95% KM (t) UCL	--	1.68E-07	J	7.27E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,6,7,8-HxCDD	mg/kg	1.51E-07	(3)	2.00E-07	95% Adjusted Gamma UCL	--	3.92E-07	J	2.00E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,7,8,9-HxCDD	mg/kg	5.50E-08	(4)	6.92E-08	95% KM (t) UCL	--	1.53E-07	J	6.92E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,4,6,7,8-HpCDD	mg/kg	1.14E-07	(3)	1.41E-07	95% Adjusted Gamma UCL	--	2.84E-07	J	1.41E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	OCDD	mg/kg	2.22E-07	(3)	2.57E-07	95% Student's-t UCL	--	4.28E-07	J	2.57E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	2,3,7,8-TCDF	mg/kg	2.90E-07	(4)	3.83E-07	95% KM (t) UCL	--	9.03E-07	J	3.83E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,7,8-PeCDF	mg/kg	5.14E-07	(3)	6.64E-07	95% Student's-t UCL	--	1.72E-06	J	6.64E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	2,3,4,7,8-PeCDF	mg/kg	6.30E-07	(3)	7.51E-07	95% Student's-t UCL	--	1.18E-06	J	7.51E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,4,7,8-HxCDF	mg/kg	7.52E-08	(4)	9.40E-08	95% KM (t) UCL	--	2.08E-07	J	9.40E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,6,7,8-HxCDF	mg/kg	1.79E-07	(3)	2.29E-07	95% Student's-t UCL	--	5.00E-07	J	2.29E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,7,8,9-HxCDF	mg/kg	7.75E-08	(4)	8.52E-08	95% KM (t) UCL	--	1.00E-07	J	8.52E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	2,3,4,6,7,8-HxCDF	mg/kg	4.50E-08	(4)	5.59E-08	95% KM (t) UCL	--	1.25E-07	J	5.59E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,4,6,7,8-HpCDF	mg/kg	5.37E-07	(3)	6.59E-07	95% Student's-t UCL	--	1.13E-06	J	6.59E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	1,2,3,4,7,8,9-HpCDF	mg/kg	6.41E-08	(4)	7.58E-08	95% KM (t) UCL	--	1.21E-07	J	7.58E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	OCDF	mg/kg	1.03E-07	(4)	1.71E-07	95% KM Chebyshev UCL	(7)	2.49E-07	J	1.71E-07	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	KM TEQ DF	mg/kg	1.47E-06	(3)	2.01E-06	95% Adjusted Gamma UCL	--	3.48E-06	--	2.01E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-77	mg/kg	6.86E-05	(3)	9.76E-05	95% Adjusted Gamma UCL	--	2.64E-04	--	9.76E-05	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-81	mg/kg	2.74E-06	(4)	3.58E-06	95% KM (t) UCL	--	7.30E-06	--	3.58E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-105	mg/kg	1.03E-03	(3)	1.25E-03	95% Student's-t UCL	--	2.24E-03	J	1.25E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-114	mg/kg	6.15E-05	(3)	7.60E-05	95% Student's-t UCL	--	1.44E-04	--	7.60E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-118	mg/kg	4.30E-03	(3)	5.24E-03	95% Student's-t UCL	--	9.38E-03	J	5.24E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-123	mg/kg	6.05E-05	(3)	7.43E-05	95% Student's-t UCL	--	1.48E-04	--	7.43E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-126	mg/kg	1.38E-05	(4)	3.84E-05	95% KM Chebyshev UCL	--	8.03E-05	--	3.84E-05	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-156/157	mg/kg	4.77E-04	(3)	5.67E-04	95% Student's-t UCL	--	1.01E-03	--	5.67E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-167	mg/kg	2.44E-04	(3)	2.90E-04	95% Student's-t UCL	--	4.61E-04	--	2.90E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-169	mg/kg	1.62E-06	(4)	1.79E-06	95% KM (t) UCL	--	2.50E-06	J	1.79E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	PCB-189	mg/kg	4.89E-05	(3)	5.65E-05	95% Student's-t UCL	--	8.38E-05	--	5.65E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	KM TEQ PCB	mg/kg	1.57E-06	(3)	4.04E-06	95% Chebyshev (Mean, Sd) UCL	--	8.30E-06	--	4.04E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Non-DL PCBs															
	Fish	Fillet	Bluefish	Total Non-DL PCBs	mg/kg	9.90E-02	(3)	1.19E-01	95% Student's-t UCL	--	2.45E-01	J	1.19E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	PAHs															
	Fish	Fillet	Bluefish	Benz(a)anthracene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Benzo(a)pyrene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Benzo(b)fluoranthene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Chrysene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Dibenz(a,h)anthracene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Indeno(1,2,3-c,d)-pyrene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Pesticides & Organics															
	Fish	Fillet	Bluefish	2,4'-DDD	mg/kg	3.72E-04	(3)	5.65E-04	95% Adjusted Gamma UCL	--	1.19E-03	J	5.65E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	2,4'-DDE	mg/kg	7.47E-04	(3)	1.03E-03	95% Student's-t UCL	--	3.05E-03	J	1.03E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	2,4'-DDT	mg/kg	1.18E-04	(4)	2.19E-04	95% KM Adjusted Gamma UCL	(6)	6.37E-04	J	2.19E-04	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	4,4'-DDD	mg/kg	4.16E-03	(3)	6.49E-03	95% Adjusted Gamma UCL	--	2.24E-02	J	6.49E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	4,4'-DDE	mg/kg	1.50E-02	(3)	3.02E-02	95% Chebyshev (Mean, Sd) UCL	(7)	6.95E-02	J	3.02E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	4,4'-DDT	mg/kg	4.27E-03	(3)	2.08E-02	95% Chebyshev (Mean, Sd) UCL	--	6.88E-02	J	2.08E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Benzaldehyde	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Chlordane, alpha (cis)	mg/kg	2.55E-03	(3)	5.86E-03	95% Chebyshev (Mean, Sd) UCL	(7)	1.43E-02	J	5.86E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Chlordane, gamma (trans)	mg/kg	1.02E-03	(3)	2.26E-03	95% Chebyshev (Mean, Sd) UCL	(7)	5.26E-03	J	2.26E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Dieldrin	mg/kg	1.84E-03	(3)	4.52E-03	95% Chebyshev (Mean, Sd) UCL	(7)	1.17E-02	J	4.52E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Heptachlor epoxide, cis-	mg/kg	4.92E-04	(3)	1.21E-03	95% Chebyshev (Mean, Sd) UCL	(7)	3.14E-03	J	1.21E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Heptachlor epoxide, trans-	mg/kg	--	(1)	--	--	(1)	1.70E-05	U	1.70E-05	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Hexachlorobenzene	mg/kg	4.33E-04	(3)	5.37E-04	95% Student's-t UCL	--	1.12E-03	J	5.37E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Mirex	mg/kg	1.07E-04	(4)	1.33E-04	95% KM Adjusted Gamma UCL	(6)	2.15E-04	J	1.33E-04	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Nonachlor, cis-	mg/kg	9.11E-04	(3)	1.67E-03	95% Chebyshev (Mean, Sd) UCL	(7)	3.44E-03	J	1.67E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Nonachlor, trans-	mg/kg	2.24E-03	(3)	3.06E-03	95% Adjusted Gamma UCL	--	8.58E-03	J	3.06E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Oxychlordane	mg/kg	2.49E-04	(4)	3.48E-04	95% KM Adjusted Gamma UCL	(6)	7.89E-04	J	3.48E-04	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Pyridine	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Inorganics															
	Fish	Fillet	Bluefish	Aluminum	mg/kg	5.01E+00	(4)	5.95E+00	95% KM (t) UCL	--	1.23E+01	J	5.95E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Arsenic, organic	mg/kg	5.27E-01	(3)	6.47E-01	95% Adjusted Gamma UCL	--	1.14E+00	--	6.47E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Arsenic, inorganic	mg/kg	5.86E-02	(3)	7.19E-02	95% Adjusted Gamma UCL	--	1.27E-01	--	7.19E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Cadmium	mg/kg	--	(1)	--	--	(1)	4.60E-02	U	4.60E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Chromium [as Cr(III)]	mg/kg	7.45E-02	(4)	8.86E-02	95% KM (t) UCL	(10)	1.67E-01	J	8.86E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Cobalt	mg/kg	--	(2)	--	--	(2)	2.23E-01	--	2.23E-01	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Copper	mg/kg	7.44E-01	(3)	7.90E-01	95% Student's-t UCL	--	1.06E+00	--	7.90E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Iron	mg/kg	8.99E+00	(4)	9.90E+00	95% KM (t) UCL	--	1.32E+01	J	9.90E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Lead	mg/kg	2.64E-02	(4)	4.20E-02	95% KM (t) UCL	--	1.52E-01	--	4.20E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Manganese	mg/kg	1.54E-01	(4)	1.82E-01	95% KM (t) UCL	--	3.23E-01	--	1.82E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum

TABLE 4-16
RAGS PART D TABLE 3.3: EXPOSURE POINT CONCENTRATION SUMMARY FOR FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration			
													Value (11)	Units	Statistic	Rationale
Biota																
	Fish	Fillet	Bluefish	Mercury	mg/kg	2.94E-01	(3)	3.26E-01	95% Student's-t UCL	--	3.96E-01	--	3.26E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Methyl Mercury	mg/kg	3.48E-01	(3)	3.88E-01	95% Student's-t UCL	--	4.67E-01	--	3.88E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Selenium	mg/kg	5.05E-01	(3)	5.39E-01	95% Student's-t UCL	--	6.78E-01	--	5.39E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Silver	mg/kg	--	(1)	--	--	(1)	2.00E-02	U	2.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Bluefish	Vanadium	mg/kg	2.13E-02	(4)	2.29E-02	95% KM (t) UCL	(10)	3.19E-02	J	2.29E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Bluefish	Zinc	mg/kg	1.65E+01	(3)	1.74E+01	95% Student's-t UCL	--	2.14E+01	--	1.74E+01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Dioxin-like Compounds															
	Fish	Fillet	Striped Bass	2,3,7,8-TCDD	mg/kg	3.00E-06	(3)	9.37E-06	95% Chebyshev (Mean, Sd) UCL	--	2.77E-05	J	9.37E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,7,8-PeCDD	mg/kg	3.95E-07	(4)	5.46E-07	95% KM (t) UCL	--	1.15E-06	J	5.46E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,4,7,8-HxCDD	mg/kg	1.58E-07	(4)	2.04E-07	95% KM (t) UCL	--	4.48E-07	J	2.04E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,6,7,8-HxCDD	mg/kg	1.49E-07	(3)	2.08E-07	95% Adjusted Gamma UCL	--	4.78E-07	J	2.08E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,7,8,9-HxCDD	mg/kg	5.72E-08	(4)	8.56E-08	95% KM Adjusted Gamma UCL	(6)	2.03E-07	J	8.56E-08	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,4,6,7,8-HpCDD	mg/kg	3.59E-07	(3)	1.43E-06	95% Chebyshev (Mean, Sd) UCL	--	4.54E-06	J	1.43E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	OCDD	mg/kg	3.16E-06	(3)	1.60E-05	95% Chebyshev (Mean, Sd) UCL	--	5.34E-05	J	1.60E-05	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	2,3,7,8-TCDF	mg/kg	1.96E-06	(3)	3.80E-06	95% Chebyshev (Mean, Sd) UCL	(7)	8.51E-06	J	3.80E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,7,8-PeCDF	mg/kg	1.82E-06	(3)	2.20E-06	95% Student's-t UCL	--	4.65E-06	J	2.20E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	2,3,4,7,8-PeCDF	mg/kg	1.48E-06	(3)	3.26E-06	95% Chebyshev (Mean, Sd) UCL	(7)	8.12E-06	J	3.26E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,4,7,8-HxCDF	mg/kg	1.62E-07	(4)	4.13E-07	95% KM Chebyshev UCL	(7)	1.16E-06	J	4.13E-07	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,6,7,8-HxCDF	mg/kg	5.08E-07	(3)	1.22E-06	95% Chebyshev (Mean, Sd) UCL	--	3.50E-06	J	1.22E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,7,8,9-HxCDF	mg/kg	9.37E-08	(3)	1.21E-07	95% Adjusted Gamma UCL	--	2.38E-07	J	1.21E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	2,3,4,6,7,8-HxCDF	mg/kg	6.92E-08	(4)	9.82E-08	95% KM (t) UCL	--	2.70E-07	J	9.82E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,4,6,7,8-HpCDF	mg/kg	1.36E-06	(3)	3.31E-06	95% Chebyshev (Mean, Sd) UCL	(7)	1.06E-05	J	3.31E-06	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	1,2,3,4,7,8,9-HpCDF	mg/kg	9.09E-08	(4)	1.08E-07	95% KM (t) UCL	--	2.15E-07	U	1.08E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	OCDF	mg/kg	1.40E-07	(3)	1.89E-07	95% Adjusted Gamma UCL	--	4.87E-07	J	1.89E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	KM TEQ DF	mg/kg	4.20E-06	(3)	1.16E-05	95% Chebyshev (Mean, Sd) UCL	--	3.30E-05	J	1.16E-05	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-77	mg/kg	4.13E-04	(3)	1.14E-03	95% Chebyshev (Mean, Sd) UCL	--	3.90E-03	J	1.14E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-81	mg/kg	9.25E-06	(4)	2.83E-05	95% KM Chebyshev UCL	(7)	1.15E-04	J	2.83E-05	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-105	mg/kg	3.07E-03	(3)	5.90E-03	95% Chebyshev (Mean, Sd) UCL	--	1.46E-02	J	5.90E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-114	mg/kg	2.87E-04	(3)	7.22E-04	95% Chebyshev (Mean, Sd) UCL	--	2.37E-03	J	7.22E-04	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-118	mg/kg	1.83E-02	(3)	3.73E-02	95% Chebyshev (Mean, Sd) UCL	--	9.99E-02	J	3.73E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-123	mg/kg	2.35E-04	(4)	5.66E-04	95% KM Chebyshev UCL	(7)	1.72E-03	J	5.66E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-126	mg/kg	6.77E-05	(4)	1.89E-04	95% KM Chebyshev UCL	--	3.67E-04	--	1.89E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-156/157	mg/kg	1.70E-03	(3)	3.27E-03	95% Chebyshev (Mean, Sd) UCL	--	8.89E-03	J	3.27E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-167	mg/kg	8.43E-04	(3)	1.46E-03	95% Chebyshev (Mean, Sd) UCL	(7)	3.49E-03	J	1.46E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-169	mg/kg	2.43E-06	(4)	3.34E-06	95% KM (t) UCL	--	1.40E-05	U	3.34E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	PCB-189	mg/kg	1.54E-04	(3)	2.84E-04	95% Chebyshev (Mean, Sd) UCL	(7)	6.95E-04	J	2.84E-04	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	KM TEQ PCB	mg/kg	7.30E-06	(3)	1.94E-05	95% Chebyshev (Mean, Sd) UCL	--	3.93E-05	--	1.94E-05	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Non-DL PCBs															
	Fish	Fillet	Striped Bass	Total Non-DL PCBs	mg/kg	3.17E-01	(3)	7.10E-01	95% Chebyshev (Mean, Sd) UCL	--	2.06E+00	J	7.10E-01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	PAHs															
	Fish	Fillet	Striped Bass	Benz(a)anthracene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Benzo(a)pyrene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Benzo(b)fluoranthene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Chrysene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Dibenz(a,h)anthracene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Indeno(1,2,3-c,d)-pyrene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Pesticides & Organics															
	Fish	Fillet	Striped Bass	2,4'-DDD	mg/kg	8.24E-03	(3)	3.27E-02	95% Chebyshev (Mean, Sd) UCL	--	1.03E-01	J	3.27E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	2,4'-DDE	mg/kg	3.45E-03	(3)	1.29E-02	95% Chebyshev (Mean, Sd) UCL	--	3.97E-02	J	1.29E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	2,4'-DDT	mg/kg	6.97E-04	(3)	2.67E-03	95% Chebyshev (Mean, Sd) UCL	--	8.38E-03	J	2.67E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	4,4'-DDD	mg/kg	3.56E-02	(3)	1.36E-01	95% Chebyshev (Mean, Sd) UCL	--	4.18E-01	J	1.36E-01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	4,4'-DDE	mg/kg	5.37E-02	(3)	1.55E-01	95% Chebyshev (Mean, Sd) UCL	--	4.23E-01	J	1.55E-01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	4,4'-DDT	mg/kg	3.60E-03	(3)	1.32E-02	95% Chebyshev (Mean, Sd) UCL	--	4.10E-02	J	1.32E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Benzaldehyde	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Chlordane, alpha (cis)	mg/kg	9.99E-03	(3)	3.53E-02	95% Chebyshev (Mean, Sd) UCL	--	1.32E-01	J	3.53E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Chlordane, gamma (trans)	mg/kg	1.84E-03	(3)	6.30E-03	95% Chebyshev (Mean, Sd) UCL	--	2.25E-02	J	6.30E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Dieldrin	mg/kg	3.96E-03	(3)	1.08E-02	95% Chebyshev (Mean, Sd) UCL	--	3.60E-02	J	1.08E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Heptachlor epoxide, cis-	mg/kg	7.64E-04	(3)	1.84E-03	95% Chebyshev (Mean, Sd) UCL	--	5.26E-03	J	1.84E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Heptachlor epoxide, trans-	mg/kg	--	(1)	--	--	(1)	1.70E-05	U	1.70E-05	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Hexachlorobenzene	mg/kg	7.20E-04	(3)	1.04E-03	95% Adjusted Gamma UCL	--	2.63E-03	J	1.04E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Mirex	mg/kg	1.59E-04	(3)	2.97E-04	95% Chebyshev (Mean, Sd) UCL	(7)	5.10E-04	--	2.97E-04	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Nonachlor, cis-	mg/kg	3.97E-03	(3)	1.10E-02	95% Chebyshev (Mean, Sd) UCL	--	3.63E-02	J	1.10E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Nonachlor, trans-	mg/kg	9.59E-03	(3)	2.64E-02	95% Chebyshev (Mean, Sd) UCL	--	8.70E-02	J	2.64E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Oxychlordane	mg/kg	1.34E-03	(3)	3.90E-03	95% Chebyshev (Mean, Sd) UCL	--	1.03E-02	J	3.90E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Pyridine	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Inorganics															
	Fish	Fillet	Striped Bass	Aluminum	mg/kg	--	(1)	--	--	(1)	5.60E+00	U	5.60E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Arsenic, organic	mg/kg	1.04E+00	(3)	1.15E+00	95% Student's-t UCL	--	1.44E+00	--	1.15E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Arsenic, inorganic	mg/kg	1.16E-01	(3)	1.27E-01	95% Student's-t UCL	--	1.60E-01	--	1.27E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Cadmium	mg/kg	--	(1)	--	--	(1)	4.60E-02	U	4.60E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Chromium [as Cr(III)]	mg/kg	9.90E-02	(4)	1.23E-01	95% KM (t) UCL	--	2.28E-01	J	1.23E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Cobalt	mg/kg	--	(1)	--	--	(1)	2.00E-02	U	2.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Copper	mg/kg	5.07E-01	(3)	5.64E-01	95% Student's-t UCL	--	7.82E-01	J	5.64E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum

TABLE 4-16
RAGS PART D TABLE 3.3: EXPOSURE POINT CONCENTRATION SUMMARY FOR FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (11)	Exposure Point Concentration Units	Exposure Point Concentration Statistic	Exposure Point Concentration Rationale
Biota																
	Fish	Fillet	Striped Bass	Iron	mg/kg	5.95E+00	(4)	6.69E+00	95% KM (t) UCL	--	9.82E+00	J	6.69E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Lead	mg/kg	--	(2)	--	--	(2)	3.58E-02	J	3.58E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Manganese	mg/kg	1.59E-01	(4)	2.16E-01	95% KM (t) UCL	--	6.36E-01	J	2.16E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Mercury	mg/kg	2.50E-01	(3)	2.82E-01	95% Student's-t UCL	--	4.85E-01	--	2.82E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Methyl Mercury	mg/kg	2.94E-01	(3)	3.38E-01	95% Student's-t UCL	--	5.76E-01	--	3.38E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Selenium	mg/kg	3.59E-01	(3)	3.79E-01	95% Student's-t UCL	--	4.44E-01	--	3.79E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Striped Bass	Silver	mg/kg	--	(1)	--	--	(1)	2.00E-02	U	2.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Vanadium	mg/kg	--	(2)	--	--	(2)	3.00E-02	U	3.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Striped Bass	Zinc	mg/kg	6.72E+00	(3)	7.34E+00	95% Adjusted Gamma UCL	--	1.07E+01	--	7.34E+00	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Dioxin-like Compounds															
	Fish	Fillet	Summer Flounder	2,3,7,8-TCDD	mg/kg	4.36E-06	(4)	5.46E-06	95% KM (t) UCL	--	1.04E-05	--	5.46E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,7,8-PeCDD	mg/kg	1.79E-07	(4)	2.43E-07	95% KM (t) UCL	--	4.72E-07	J	2.43E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,4,7,8-HxCDD	mg/kg	5.93E-08	(4)	8.09E-08	95% KM Adjusted Gamma UCL	(6)	1.64E-07	J	8.09E-08	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,6,7,8-HxCDD	mg/kg	2.08E-07	(3)	2.54E-07	95% Student's-t UCL	--	4.35E-07	J	2.54E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,7,8,9-HxCDD	mg/kg	8.82E-08	(4)	1.08E-07	95% KM (t) UCL	--	1.78E-07	J	1.08E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,4,6,7,8-HpCDD	mg/kg	2.59E-07	(3)	3.10E-07	95% Student's-t UCL	--	5.97E-07	J	3.10E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	OCDD	mg/kg	3.95E-07	(3)	4.50E-07	95% Student's-t UCL	--	6.33E-07	J	4.50E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	2,3,7,8-TCDF	mg/kg	2.02E-07	(4)	2.68E-07	95% KM (t) UCL	--	5.91E-07	J	2.68E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,7,8-PeCDF	mg/kg	2.74E-07	(4)	3.49E-07	95% KM (t) UCL	--	8.01E-07	J	3.49E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	2,3,4,7,8-PeCDF	mg/kg	7.40E-07	(3)	8.94E-07	95% Student's-t UCL	--	1.55E-06	J	8.94E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,4,7,8-HxCDF	mg/kg	3.78E-07	(3)	6.51E-07	95% Chebyshev (Mean, Sd) UCL	(7)	1.00E-06	J	6.51E-07	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,6,7,8-HxCDF	mg/kg	2.19E-07	(3)	2.65E-07	95% Student's-t UCL	--	4.25E-07	J	2.65E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,7,8,9-HxCDF	mg/kg	1.10E-07	(3)	1.43E-07	95% Adjusted Gamma UCL	--	2.71E-07	J	1.43E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	2,3,4,6,7,8-HxCDF	mg/kg	8.76E-08	(4)	1.09E-07	95% KM (t) UCL	--	1.86E-07	J	1.09E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,4,6,7,8-HpCDF	mg/kg	3.90E-07	(3)	4.95E-07	95% Student's-t UCL	--	8.20E-07	J	4.95E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	1,2,3,4,7,8,9-HpCDF	mg/kg	7.63E-08	(4)	1.08E-07	95% KM Adjusted Gamma UCL	(6)	2.16E-07	J	1.08E-07	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	OCDF	mg/kg	1.62E-07	(3)	1.99E-07	95% Student's-t UCL	--	3.24E-07	J	1.99E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	KM TEQ DF	mg/kg	4.88E-06	(3)	6.04E-06	95% Student's-t UCL	--	1.10E-05	--	6.04E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-77	mg/kg	9.88E-05	(3)	1.43E-04	95% Adjusted Gamma UCL	--	2.44E-04	--	1.43E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-81	mg/kg	7.92E-06	(4)	1.48E-05	95% KM Adjusted Gamma UCL	(6)	3.72E-05	--	1.48E-05	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-105	mg/kg	2.00E-03	(3)	2.75E-03	95% Student's-t UCL	--	7.34E-03	J	2.75E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-114	mg/kg	1.74E-04	(3)	2.35E-04	95% Student's-t UCL	--	6.15E-04	J	2.35E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-118	mg/kg	7.97E-03	(3)	1.17E-02	95% Adjusted Gamma UCL	--	2.93E-02	J	1.17E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-123	mg/kg	1.27E-04	(4)	1.79E-04	95% KM (t) UCL	--	5.19E-04	--	1.79E-04	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-126	mg/kg	2.89E-05	(4)	4.35E-05	95% KM (t) UCL	--	1.12E-04	--	4.35E-05	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-156/157	mg/kg	8.47E-04	(3)	1.15E-03	95% Student's-t UCL	--	3.14E-03	J	1.15E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-167	mg/kg	3.42E-04	(3)	5.29E-04	95% Adjusted Gamma UCL	--	1.27E-03	J	5.29E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	PCB-169	mg/kg	--	(2)	--	--	(2)	2.03E-06	J	2.03E-06	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	PCB-189	mg/kg	5.66E-05	(3)	7.89E-05	95% Student's-t UCL	--	2.38E-04	--	7.89E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	KM TEQ PCB	mg/kg	2.60E-06	(3)	4.81E-06	95% Adjusted Gamma UCL	--	1.20E-05	--	4.81E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Non-DL PCBs															
	Fish	Fillet	Summer Flounder	Total Non-DL PCBs	mg/kg	1.07E-01	(3)	1.48E-01	95% Student's-t UCL	--	4.52E-01	J	1.48E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	PAHs															
	Fish	Fillet	Summer Flounder	Benz(a)anthracene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Benzo(a)pyrene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Benzo(b)fluoranthene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Chrysene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Dibenz(a,h)anthracene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Indeno(1,2,3-c,d)-pyrene	mg/kg	--	(1)	--	--	(1)	5.30E-03	U	5.30E-03	mg/kg	Maximum	Maximum used because 95% UCL not available
	Pesticides & Organics															
	Fish	Fillet	Summer Flounder	2,4'-DDD	mg/kg	1.21E-03	(3)	3.32E-03	95% Chebyshev (Mean, Sd) UCL	--	9.18E-03	J	3.32E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	2,4'-DDE	mg/kg	1.72E-03	(3)	2.77E-03	95% Adjusted Gamma UCL	--	7.52E-03	J	2.77E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	2,4'-DDT	mg/kg	9.63E-05	(4)	2.17E-04	95% Gamma Adjusted KM-UCL	--	6.13E-04	J	2.17E-04	mg/kg	95% Gamma Adjusted KM-UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	4,4'-DDD	mg/kg	7.95E-03	(3)	1.89E-02	95% Chebyshev (Mean, Sd) UCL	--	4.50E-02	J	1.89E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	4,4'-DDE	mg/kg	1.98E-02	(3)	4.05E-02	95% Chebyshev (Mean, Sd) UCL	--	6.31E-02	J	4.05E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	4,4'-DDT	mg/kg	6.08E-04	(4)	1.45E-03	95% KM Chebyshev UCL	--	2.54E-03	J	1.45E-03	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Benzaldehyde	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Chlordane, alpha (cis)	mg/kg	1.62E-03	(3)	2.09E-03	95% Student's-t UCL	--	4.62E-03	J	2.09E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Chlordane, gamma (trans)	mg/kg	5.53E-04	(3)	6.88E-04	95% Student's-t UCL	--	1.21E-03	J	6.88E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Dieldrin	mg/kg	1.16E-03	(3)	1.42E-03	95% Student's-t UCL	--	2.53E-03	J	1.42E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Heptachlor epoxide, cis-	mg/kg	2.79E-04	(3)	3.42E-04	95% Student's-t UCL	--	5.51E-04	--	3.42E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Heptachlor epoxide, trans-	mg/kg	--	(1)	--	--	(1)	1.70E-05	U	1.70E-05	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Hexachlorobenzene	mg/kg	4.02E-04	(3)	4.89E-04	95% Student's-t UCL	--	8.12E-04	J	4.89E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Mirex	mg/kg	4.51E-05	(4)	6.28E-05	95% KM Adjusted Gamma UCL	(6)	9.74E-05	J	6.28E-05	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Nonachlor, cis-	mg/kg	8.52E-04	(3)	1.12E-03	95% Student's-t UCL	--	2.45E-03	J	1.12E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Nonachlor, trans-	mg/kg	2.09E-03	(3)	2.80E-03	95% Student's-t UCL	--	6.72E-03	J	2.80E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Oxychlordane	mg/kg	9.01E-04	(3)	1.27E-03	95% Adjusted Gamma UCL	--	2.70E-03	--	1.27E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Pyridine	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Inorganics										--	--				
	Fish	Fillet	Summer Flounder	Aluminum	mg/kg	--	(1)	--	--	(1)	5.60E+00	U	5.60E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Arsenic, organic	mg/kg	1.37E+00	(3)	1.65E+00	95% Adjusted Gamma UCL	--	3.24E+00	--	1.65E+00	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Arsenic, inorganic	mg/kg	1.52E-01	(3)	1.83E-01	95% Adjusted Gamma UCL	--	3.60E-01	--	1.83E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Cadmium	mg/kg	--	(1)	--	--	(1)	4.60E-02	U	4.60E-02	mg/kg	Maximum	Maximum used because 95% UCL not available

TABLE 4-16
RAGS PART D TABLE 3.3: EXPOSURE POINT CONCENTRATION SUMMARY FOR FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration: Value (11)	Exposure Point Concentration: Units	Exposure Point Concentration: Statistic	Exposure Point Concentration: Rationale
Biota																
	Fish	Fillet	Summer Flounder	Chromium [as Cr(III)]	mg/kg	1.48E-01	(4)	4.61E-01	95% KM Chebyshev UCL	--	1.23E+00	--	4.61E-01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Cobalt	mg/kg	1.43E-01	(4)	8.56E-01	95% KM Chebyshev UCL	(9)	2.16E+00	--	8.56E-01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Copper	mg/kg	1.86E-01	(3)	2.10E-01	95% Adjusted Gamma UCL	--	3.91E-01	--	2.10E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Iron	mg/kg	--	(2)	--	--	(2)	5.13E+00	J	5.13E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Lead	mg/kg	--	(1)	--	--	(1)	2.60E-02	U	2.60E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Manganese	mg/kg	2.83E-01	(4)	3.17E-01	95% KM (t) UCL	--	4.19E-01	--	3.17E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Mercury	mg/kg	1.50E-01	(3)	1.81E-01	95% Adjusted Gamma UCL	--	3.48E-01	--	1.81E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Methyl Mercury	mg/kg	1.80E-01	(3)	2.13E-01	95% Student's-t UCL	--	4.00E-01	--	2.13E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Selenium	mg/kg	5.99E-01	(3)	6.43E-01	95% Student's-t UCL	--	8.19E-01	--	6.43E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	Summer Flounder	Silver	mg/kg	--	(1)	--	--	(1)	2.00E-02	U	2.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Vanadium	mg/kg	--	(1)	--	--	(1)	3.00E-02	U	3.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	Summer Flounder	Zinc	mg/kg	6.39E+00	(3)	6.84E+00	95% Student's-t UCL	--	7.93E+00	--	6.84E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Dioxin-like Compounds															
	Fish	Fillet	White Perch	2,3,7,8-TCDD	mg/kg	1.32E-05	(3)	1.61E-05	95% Student's-t UCL	--	3.18E-05	J	1.61E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,7,8-PeCDD	mg/kg	2.94E-07	(4)	4.23E-07	95% KM (t) UCL	--	7.36E-07	J	4.23E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,4,7,8-HxCDD	mg/kg	2.06E-07	(3)	2.42E-07	95% Student's-t UCL	--	3.89E-07	J	2.42E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,6,7,8-HxCDD	mg/kg	5.29E-07	(3)	6.02E-07	95% Student's-t UCL	--	9.26E-07	J	6.02E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,7,8,9-HxCDD	mg/kg	1.19E-07	(4)	1.40E-07	95% KM (t) UCL	--	2.24E-07	J	1.40E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,4,6,7,8-HpCDD	mg/kg	3.26E-07	(3)	3.70E-07	95% Student's-t UCL	--	5.55E-07	J	3.70E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	OCDD	mg/kg	7.18E-07	(3)	8.45E-07	95% Adjusted Gamma UCL	--	1.51E-06	J	8.45E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	2,3,7,8-TCDF	mg/kg	3.33E-06	(3)	3.86E-06	95% Student's-t UCL	--	6.39E-06	J	3.86E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,7,8-PeCDF	mg/kg	2.58E-06	(3)	3.03E-06	95% Adjusted Gamma UCL	--	4.93E-06	J	3.03E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	2,3,4,7,8-PeCDF	mg/kg	3.08E-06	(3)	3.40E-06	95% Student's-t UCL	--	4.80E-06	J	3.40E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,4,7,8-HxCDF	mg/kg	1.34E-06	(3)	1.62E-06	95% Student's-t UCL	--	3.76E-06	J	1.62E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,6,7,8-HxCDF	mg/kg	1.05E-06	(3)	1.19E-06	95% Student's-t UCL	--	1.66E-06	J	1.19E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,7,8,9-HxCDF	mg/kg	8.98E-08	(4)	1.05E-07	95% KM (t) UCL	(10)	2.08E-07	J	1.05E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	2,3,4,6,7,8-HxCDF	mg/kg	1.90E-07	(3)	2.14E-07	95% Student's-t UCL	--	3.30E-07	J	2.14E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,4,6,7,8-HpCDF	mg/kg	1.88E-06	(3)	2.39E-06	95% Adjusted Gamma UCL	--	4.12E-06	J	2.39E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	1,2,3,4,7,8,9-HpCDF	mg/kg	7.45E-08	(4)	8.77E-08	95% KM (t) UCL	--	1.81E-07	J	8.77E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	OCDF	mg/kg	1.82E-07	(3)	2.18E-07	95% Student's-t UCL	--	4.08E-07	J	2.18E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	KM TEQ DF	mg/kg	1.52E-05	(3)	1.82E-05	95% Student's-t UCL	--	3.37E-05	J	1.82E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-77	mg/kg	8.70E-04	(3)	9.78E-04	95% Student's-t UCL	--	1.51E-03	--	9.78E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-81	mg/kg	3.13E-05	(4)	3.67E-05	95% KM (t) UCL	--	6.02E-05	--	3.67E-05	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-105	mg/kg	6.64E-03	(3)	7.43E-03	95% Student's-t UCL	--	9.93E-03	J	7.43E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-114	mg/kg	5.04E-04	(3)	5.64E-04	95% Student's-t UCL	--	7.72E-04	--	5.64E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-118	mg/kg	2.50E-02	(3)	2.80E-02	95% Student's-t UCL	--	3.75E-02	J	2.80E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-123	mg/kg	4.93E-04	(3)	5.58E-04	95% Student's-t UCL	--	7.50E-04	--	5.58E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-126	mg/kg	5.46E-05	(3)	6.05E-05	95% Student's-t UCL	--	7.88E-05	--	6.05E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-156/157	mg/kg	2.57E-03	(3)	2.85E-03	95% Student's-t UCL	--	3.71E-03	--	2.85E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-167	mg/kg	1.04E-03	(3)	1.16E-03	95% Student's-t UCL	--	1.53E-03	--	1.16E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	PCB-169	mg/kg	--	(1)	--	--	(1)	7.46E-06	U	7.46E-06	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	PCB-189	mg/kg	1.93E-04	(3)	2.24E-04	95% Student's-t UCL	--	2.83E-04	--	2.24E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	KM TEQ PCB	mg/kg	6.70E-06	(3)	7.42E-06	95% Student's-t UCL	--	9.73E-06	--	7.42E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Non-DL PCBs															
	Fish	Fillet	White Perch	Total Non-DL PCBs	mg/kg	4.19E-01	(3)	4.73E-01	95% Student's-t UCL	--	6.47E-01	J	4.73E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	PAHs															
	Fish	Fillet	White Perch	Benz(a)anthracene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Benzo(a)pyrene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Benzo(b)fluoranthene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Chrysene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Dibenz(a,h)anthracene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Indeno(1,2,3-c,d)-pyrene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Pesticides & Organics															
	Fish	Fillet	White Perch	2,4'-DDD	mg/kg	3.27E-02	(3)	5.11E-02	95% Adjusted Gamma UCL	--	1.01E-01	J	5.11E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	2,4'-DDE	mg/kg	8.33E-03	(3)	1.03E-02	95% Student's-t UCL	--	2.13E-02	--	1.03E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	2,4'-DDT	mg/kg	5.15E-03	(3)	1.39E-02	95% Chebyshev (Mean, Sd) UCL	(8)	3.04E-02	J	1.39E-02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	4,4'-DDD	mg/kg	1.02E-01	(3)	1.55E-01	95% Adjusted Gamma UCL	--	3.93E-01	J	1.55E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	4,4'-DDE	mg/kg	9.77E-02	(3)	1.19E-01	95% Student's-t UCL	--	2.49E-01	J	1.19E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	4,4'-DDT	mg/kg	1.52E-02	(3)	2.78E-02	95% Adjusted Gamma UCL	--	6.35E-02	J	2.78E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Benzaldehyde	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Chlordane, alpha (cis)	mg/kg	1.89E-02	(3)	2.37E-02	95% Adjusted Gamma UCL	--	5.52E-02	J	2.37E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Chlordane, gamma (trans)	mg/kg	3.87E-03	(3)	4.83E-03	95% Student's-t UCL	--	1.13E-02	--	4.83E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Dieldrin	mg/kg	6.28E-03	(3)	7.29E-03	95% Adjusted Gamma UCL	--	1.17E-02	--	7.29E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Heptachlor epoxide, cis-	mg/kg	1.67E-03	(3)	2.11E-03	95% Adjusted Gamma UCL	--	4.70E-03	--	2.11E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Heptachlor epoxide, trans-	mg/kg	--	(1)	--	--	(1)	1.70E-05	U	1.70E-05	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Hexachlorobenzene	mg/kg	1.08E-03	(3)	1.26E-03	95% Student's-t UCL	--	2.22E-03	J	1.26E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Mirex	mg/kg	2.72E-04	(3)	3.58E-04	95% Student's-t UCL	--	9.42E-04	--	3.58E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Nonachlor, cis-	mg/kg	6.55E-03	(3)	7.51E-03	95% Student's-t UCL	--	1.18E-02	--	7.51E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Nonachlor, trans-	mg/kg	1.68E-02	(3)	1.92E-02	95% Student's-t UCL	--	3.00E-02	J	1.92E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Oxychlordane	mg/kg	2.71E-03	(3)	3.10E-03	95% Student's-t UCL	--	4.53E-03	--	3.10E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Pyridine	mg/kg	--	(1)	--	--	(1)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Inorganics															
	Fish	Fillet	White Perch	Aluminum	mg/kg	5.18E+00	(4)	8.74E+00	95% KM Chebyshev UCL	--	1.52E+01	J	8.74E+00	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum

TABLE 4-16
RAGS PART D TABLE 3.3: EXPOSURE POINT CONCENTRATION SUMMARY FOR FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Fish
Exposure Medium: Fish

Exposure Point	Matrix	Tissue	Species	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (11)	Exposure Point Concentration Units	Exposure Point Concentration Statistic	Exposure Point Concentration Rationale
Biota																
	Fish	Fillet	White Perch	Arsenic, organic	mg/kg	6.04E-01	(3)	6.91E-01	95% Student's-t UCL	--	1.07E+00	J	6.91E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Arsenic, inorganic	mg/kg	6.71E-02	(3)	7.67E-02	95% Student's-t UCL	--	1.19E-01	J	7.67E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Cadmium	mg/kg	--	(1)	--	--	(1)	4.60E-02	U	4.60E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Chromium [as Cr(III)]	mg/kg	1.19E-01	(4)	1.44E-01	95% KM Adjusted Gamma UCL	(10)	2.78E-01	J	1.44E-01	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Cobalt	mg/kg	--	(1)	--	--	(1)	2.00E-02	U	2.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Copper	mg/kg	6.07E-01	(3)	6.33E-01	95% Student's-t UCL	--	8.01E-01	--	6.33E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Iron	mg/kg	5.75E+00	(4)	6.12E+00	95% KM (t) UCL	(10)	7.55E+00	J	6.12E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Lead	mg/kg	3.94E-02	(4)	5.04E-02	95% KM Adjusted Gamma UCL	(10)	1.03E-01	J	5.04E-02	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Manganese	mg/kg	2.92E-01	(4)	3.79E-01	95% KM (t) UCL	--	8.71E-01	--	3.79E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Mercury	mg/kg	2.69E-01	(3)	3.04E-01	95% Student's-t UCL	--	4.42E-01	--	3.04E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Methyl Mercury	mg/kg	3.52E-01	(3)	4.13E-01	95% Student's-t UCL	--	7.38E-01	--	4.13E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Selenium	mg/kg	6.10E-01	(3)	6.50E-01	95% Student's-t UCL	--	8.11E-01	--	6.50E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Fish	Fillet	White Perch	Silver	mg/kg	--	(1)	--	--	(1)	2.00E-02	U	2.00E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Vanadium	mg/kg	--	(2)	--	--	(2)	3.43E-02	J	3.43E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Fish	Fillet	White Perch	Zinc	mg/kg	1.12E+01	(3)	1.25E+01	95% Student's-t UCL	--	1.87E+01	--	1.25E+01	mg/kg	95% Student's-t UCL	95% UCL less than maximum

Definitions
COPC - chemical of potential concern, CTE - central tendency exposure, DF - dioxin/furan, J - estimated value, KM - Kaplan-Meier, mgkg - milligram per kilogram, NDL-PCB - nondioxin-like PCB, PCB - polychlorinated biphenyl, RME - reasonable maximum exposure, TEQ - toxicity equivalence, U - not detected, UCL - upper confidence limit on the mean

Notes
Statistics were calculated using ProUCL version 5.1.
(1) Mean and 95% UCL could not be calculated because all samples were non-detects.
(2) Mean and 95% UCL could not be calculated because there was only one distinct detected value.
(3) Arithmetic mean reported because detection frequency was 100%.
(4) Kaplan-Meier mean reported because detection frequency was less than 100%, but (1) and (2) did not apply.
(5) Pro-UCL's maximum suggested UCL was an H-UCL. The second-greatest suggested UCL was substituted.
(6) ProUCL's maximum suggested UCL was a GROS Adjusted Gamma UCL. The second-greatest suggested UCL was substituted.
(7) Pro-UCL's maximum suggested UCL was an H-UCL. The 95% Chebyshev UCL was substituted.
(8) Pro-UCL's maximum suggested UCL was a 99% UCL. The 95% Chebyshev UCL was substituted.
(9) Pro-UCL's maximum suggested UCL was a 97.5% UCL. The 95% Chebyshev UCL was substituted.
(10) ProUCL suggested more than one 95% UCL distribution; the greatest of the suggested 95% UCL values is reported here.
(11) Consistent with risk assessment guidance, the exposure point concentration used to evaluate RME is also used to evaluate CTE.

*For consistency, if a chemical was identified as a COPC in any fish or crab tissue, it was retained as a COPC for all tissue types. Therefore, the COPC lists are identical for all types of biota.

TABLE 4-17
RAGS PART D TABLE 3.4: EXPOSURE POINT CONCENTRATION SUMMARY FOR ALL SPECIES FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: All Species Fish
Exposure Medium: All Species Fish

	Chemical of Potential Concern	American Eel		Bluefish		Striped Bass		Summer Flounder		White Perch		All Species (average of the five species)	
	*See Note Below	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units
Dioxin-like Compounds													
	2,3,7,8-TCDD	8.77E-06	mg/kg	1.48E-06	mg/kg	9.37E-06	mg/kg	5.46E-06	mg/kg	1.61E-05	mg/kg	8.24E-06	mg/kg
	1,2,3,7,8-PeCDD	7.01E-07	mg/kg	2.97E-07	mg/kg	5.46E-07	mg/kg	2.43E-07	mg/kg	4.23E-07	mg/kg	4.42E-07	mg/kg
	1,2,3,4,7,8-HxCDD	4.18E-07	mg/kg	7.27E-08	mg/kg	2.04E-07	mg/kg	8.09E-08	mg/kg	2.42E-07	mg/kg	2.04E-07	mg/kg
	1,2,3,6,7,8-HxCDD	1.89E-06	mg/kg	2.00E-07	mg/kg	2.08E-07	mg/kg	2.54E-07	mg/kg	6.02E-07	mg/kg	6.32E-07	mg/kg
	1,2,3,7,8,9-HxCDD	3.46E-07	mg/kg	6.92E-08	mg/kg	8.56E-08	mg/kg	1.08E-07	mg/kg	1.40E-07	mg/kg	1.50E-07	mg/kg
	1,2,3,4,6,7,8-HpCDD	1.29E-06	mg/kg	1.41E-07	mg/kg	1.43E-06	mg/kg	3.10E-07	mg/kg	3.70E-07	mg/kg	7.10E-07	mg/kg
	OCDD	3.17E-06	mg/kg	2.57E-07	mg/kg	1.60E-05	mg/kg	4.50E-07	mg/kg	8.45E-07	mg/kg	4.15E-06	mg/kg
	2,3,7,8-TCDF	1.05E-07	mg/kg	3.83E-07	mg/kg	3.80E-06	mg/kg	2.68E-07	mg/kg	3.86E-06	mg/kg	1.68E-06	mg/kg
	1,2,3,7,8-PeCDF	1.40E-06	mg/kg	6.64E-07	mg/kg	2.20E-06	mg/kg	3.49E-07	mg/kg	3.03E-06	mg/kg	1.53E-06	mg/kg
	2,3,4,7,8-PeCDF	3.85E-06	mg/kg	7.51E-07	mg/kg	3.26E-06	mg/kg	8.94E-07	mg/kg	3.40E-06	mg/kg	2.43E-06	mg/kg
	1,2,3,4,7,8-HxCDF	2.69E-06	mg/kg	9.40E-08	mg/kg	4.13E-07	mg/kg	6.51E-07	mg/kg	1.62E-06	mg/kg	1.09E-06	mg/kg
	1,2,3,6,7,8-HxCDF	2.02E-06	mg/kg	2.29E-07	mg/kg	1.22E-06	mg/kg	2.65E-07	mg/kg	1.19E-06	mg/kg	9.84E-07	mg/kg
	1,2,3,7,8,9-HxCDF	1.14E-07	mg/kg	8.52E-08	mg/kg	1.21E-07	mg/kg	1.43E-07	mg/kg	1.05E-07	mg/kg	1.13E-07	mg/kg
	2,3,4,6,7,8-HxCDF	3.63E-07	mg/kg	5.59E-08	mg/kg	9.82E-08	mg/kg	1.09E-07	mg/kg	2.14E-07	mg/kg	1.68E-07	mg/kg
	1,2,3,4,6,7,8-HpCDF	4.75E-06	mg/kg	6.59E-07	mg/kg	3.31E-06	mg/kg	4.95E-07	mg/kg	2.39E-06	mg/kg	2.32E-06	mg/kg
	1,2,3,4,7,8,9-HpCDF	1.61E-07	mg/kg	7.58E-08	mg/kg	1.08E-07	mg/kg	1.08E-07	mg/kg	8.77E-08	mg/kg	1.08E-07	mg/kg
	OCDF	3.60E-07	mg/kg	1.71E-07	mg/kg	1.89E-07	mg/kg	1.99E-07	mg/kg	2.18E-07	mg/kg	2.27E-07	mg/kg
	KM TEQ DF	1.12E-05	mg/kg	2.01E-06	mg/kg	1.16E-05	mg/kg	6.04E-06	mg/kg	1.82E-05	mg/kg	9.82E-06	mg/kg
	PCB-77	7.49E-05	mg/kg	9.76E-05	mg/kg	1.14E-03	mg/kg	1.43E-04	mg/kg	9.78E-04	mg/kg	4.87E-04	mg/kg
	PCB-81	1.17E-05	mg/kg	3.58E-06	mg/kg	2.83E-05	mg/kg	1.48E-05	mg/kg	3.67E-05	mg/kg	1.90E-05	mg/kg
	PCB-105	2.07E-02	mg/kg	1.25E-03	mg/kg	5.90E-03	mg/kg	2.75E-03	mg/kg	7.43E-03	mg/kg	7.61E-03	mg/kg
	PCB-114	1.32E-03	mg/kg	7.60E-05	mg/kg	7.22E-04	mg/kg	2.35E-04	mg/kg	5.64E-04	mg/kg	5.83E-04	mg/kg
	PCB-118	7.11E-02	mg/kg	5.24E-03	mg/kg	3.73E-02	mg/kg	1.17E-02	mg/kg	2.80E-02	mg/kg	3.07E-02	mg/kg
	PCB-123	1.41E-03	mg/kg	7.43E-05	mg/kg	5.66E-04	mg/kg	1.79E-04	mg/kg	5.58E-04	mg/kg	5.57E-04	mg/kg
	PCB-126	1.19E-04	mg/kg	3.84E-05	mg/kg	1.89E-04	mg/kg	4.35E-05	mg/kg	6.05E-05	mg/kg	9.01E-05	mg/kg
	PCB-156/157	6.20E-03	mg/kg	5.67E-04	mg/kg	3.27E-03	mg/kg	1.15E-03	mg/kg	2.85E-03	mg/kg	2.81E-03	mg/kg
	PCB-167	2.70E-03	mg/kg	2.90E-04	mg/kg	1.46E-03	mg/kg	5.29E-04	mg/kg	1.16E-03	mg/kg	1.23E-03	mg/kg
	PCB-169	4.36E-06	mg/kg	1.79E-06	mg/kg	3.34E-06	mg/kg	2.03E-06	mg/kg	7.46E-06	mg/kg	3.80E-06	mg/kg
	PCB-189	4.83E-04	mg/kg	5.65E-05	mg/kg	2.84E-04	mg/kg	7.89E-05	mg/kg	2.24E-04	mg/kg	2.25E-04	mg/kg
	KM TEQ PCB	2.16E-05	mg/kg	4.04E-06	mg/kg	1.94E-05	mg/kg	4.81E-06	mg/kg	7.42E-06	mg/kg	1.15E-05	mg/kg
Non-DL PCBs													
	Total Non-DL PCBs	5.91E-01	mg/kg	1.19E-01	mg/kg	7.10E-01	mg/kg	1.48E-01	mg/kg	4.73E-01	mg/kg	4.08E-01	mg/kg
PAHs													
	Benz(a)anthracene	1.30E-02	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	1.30E-02	mg/kg	8.38E-03	mg/kg
	Benzo(a)pyrene	1.30E-02	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	1.30E-02	mg/kg	8.38E-03	mg/kg
	Benzo(b)fluoranthene	1.30E-02	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	1.30E-02	mg/kg	8.38E-03	mg/kg
	Chrysene	1.30E-02	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	1.30E-02	mg/kg	8.38E-03	mg/kg
	Dibenz(a,h)anthracene	1.30E-02	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	1.30E-02	mg/kg	8.38E-03	mg/kg
	Indeno(1,2,3-c,d)-pyrene	1.30E-02	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	5.30E-03	mg/kg	1.30E-02	mg/kg	8.38E-03	mg/kg
Pesticides & Organics													
	2,4'-DDD	3.07E-03	mg/kg	5.65E-04	mg/kg	3.27E-02	mg/kg	3.32E-03	mg/kg	5.11E-02	mg/kg	1.82E-02	mg/kg
	2,4'-DDE	1.97E-03	mg/kg	1.03E-03	mg/kg	1.29E-02	mg/kg	2.77E-03	mg/kg	1.03E-02	mg/kg	5.79E-03	mg/kg
	2,4'-DDT	3.58E-04	mg/kg	2.19E-04	mg/kg	2.67E-03	mg/kg	2.17E-04	mg/kg	1.39E-02	mg/kg	3.47E-03	mg/kg
	4,4'-DDD	1.31E-01	mg/kg	6.49E-03	mg/kg	1.36E-01	mg/kg	1.89E-02	mg/kg	1.55E-01	mg/kg	8.95E-02	mg/kg
	4,4'-DDE	2.79E-01	mg/kg	3.02E-02	mg/kg	1.55E-01	mg/kg	4.05E-02	mg/kg	1.19E-01	mg/kg	1.25E-01	mg/kg
	4,4'-DDT	7.69E-03	mg/kg	2.08E-02	mg/kg	1.32E-02	mg/kg	1.45E-03	mg/kg	2.78E-02	mg/kg	1.42E-02	mg/kg
	Benzaldehyde	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg
	Chlordane, alpha (cis)	1.40E-02	mg/kg	5.86E-03	mg/kg	3.53E-02	mg/kg	2.09E-03	mg/kg	2.37E-02	mg/kg	1.62E-02	mg/kg
	Chlordane, gamma (trans)	3.89E-03	mg/kg	2.26E-03	mg/kg	6.30E-03	mg/kg	6.88E-04	mg/kg	4.83E-03	mg/kg	3.59E-03	mg/kg
	Dieldrin	1.43E-02	mg/kg	4.52E-03	mg/kg	1.08E-02	mg/kg	1.42E-03	mg/kg	7.29E-03	mg/kg	7.67E-03	mg/kg

TABLE 4-17
RAGS PART D TABLE 3.4: EXPOSURE POINT CONCENTRATION SUMMARY FOR ALL SPECIES FISH - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: All Species Fish
Exposure Medium: All Species Fish

	Chemical of Potential Concern	American Eel		Bluefish		Striped Bass		Summer Flounder		White Perch		All Species (average of the five species)	
	*See Note Below	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units	EPC Value (1)	EPC Units
	Heptachlor epoxide, cis-	3.75E-03	mg/kg	1.21E-03	mg/kg	1.84E-03	mg/kg	3.42E-04	mg/kg	2.11E-03	mg/kg	1.85E-03	mg/kg
	Heptachlor epoxide, trans-	3.81E-04	mg/kg	1.70E-05	mg/kg	1.70E-05	mg/kg	1.70E-05	mg/kg	1.70E-05	mg/kg	8.97E-05	mg/kg
	Hexachlorobenzene	4.07E-03	mg/kg	5.37E-04	mg/kg	1.04E-03	mg/kg	4.89E-04	mg/kg	1.26E-03	mg/kg	1.48E-03	mg/kg
	Mirex	4.18E-04	mg/kg	1.33E-04	mg/kg	2.97E-04	mg/kg	6.28E-05	mg/kg	3.58E-04	mg/kg	2.54E-04	mg/kg
	Nonachlor, cis-	1.08E-02	mg/kg	1.67E-03	mg/kg	1.10E-02	mg/kg	1.12E-03	mg/kg	7.51E-03	mg/kg	6.42E-03	mg/kg
	Nonachlor, trans-	2.62E-02	mg/kg	3.06E-03	mg/kg	2.64E-02	mg/kg	2.80E-03	mg/kg	1.92E-02	mg/kg	1.55E-02	mg/kg
	Oxychlordane	1.43E-02	mg/kg	3.48E-04	mg/kg	3.90E-03	mg/kg	1.27E-03	mg/kg	3.10E-03	mg/kg	4.58E-03	mg/kg
	Pyridine	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg	1.30E+00	mg/kg
Inorganics													
	Aluminum	6.27E+00	mg/kg	5.95E+00	mg/kg	5.60E+00	mg/kg	5.60E+00	mg/kg	8.74E+00	mg/kg	6.43E+00	mg/kg
	Arsenic, organic	1.07E+00	mg/kg	6.47E-01	mg/kg	1.15E+00	mg/kg	1.65E+00	mg/kg	6.91E-01	mg/kg	1.04E+00	mg/kg
	Arsenic, inorganic	1.19E-01	mg/kg	7.19E-02	mg/kg	1.27E-01	mg/kg	1.83E-01	mg/kg	7.67E-02	mg/kg	1.16E-01	mg/kg
	Cadmium	4.55E-02	mg/kg	4.60E-02	mg/kg	4.60E-02	mg/kg	4.60E-02	mg/kg	4.60E-02	mg/kg	4.59E-02	mg/kg
	Chromium [as Cr(III)]	2.42E+00	mg/kg	8.86E-02	mg/kg	1.23E-01	mg/kg	4.61E-01	mg/kg	1.44E-01	mg/kg	6.47E-01	mg/kg
	Cobalt	7.00E-03	mg/kg	2.23E-01	mg/kg	2.00E-02	mg/kg	8.56E-01	mg/kg	2.00E-02	mg/kg	2.25E-01	mg/kg
	Copper	2.10E-01	mg/kg	7.90E-01	mg/kg	5.64E-01	mg/kg	2.10E-01	mg/kg	6.33E-01	mg/kg	4.81E-01	mg/kg
	Iron	7.54E+00	mg/kg	9.90E+00	mg/kg	6.69E+00	mg/kg	5.13E+00	mg/kg	6.12E+00	mg/kg	7.08E+00	mg/kg
	Lead	2.30E-02	mg/kg	4.20E-02	mg/kg	3.58E-02	mg/kg	2.60E-02	mg/kg	5.04E-02	mg/kg	3.54E-02	mg/kg
	Manganese	3.40E-01	mg/kg	1.82E-01	mg/kg	2.16E-01	mg/kg	3.17E-01	mg/kg	3.79E-01	mg/kg	2.87E-01	mg/kg
	Mercury	4.19E-01	mg/kg	3.26E-01	mg/kg	2.82E-01	mg/kg	1.81E-01	mg/kg	3.04E-01	mg/kg	3.02E-01	mg/kg
	Methyl Mercury	4.59E-01	mg/kg	3.88E-01	mg/kg	3.38E-01	mg/kg	2.13E-01	mg/kg	4.13E-01	mg/kg	3.62E-01	mg/kg
	Selenium	5.13E-01	mg/kg	5.39E-01	mg/kg	3.79E-01	mg/kg	6.43E-01	mg/kg	6.50E-01	mg/kg	5.45E-01	mg/kg
	Silver	1.98E-02	mg/kg	2.00E-02	mg/kg	2.00E-02	mg/kg	2.00E-02	mg/kg	2.00E-02	mg/kg	2.00E-02	mg/kg
	Vanadium	2.27E-02	mg/kg	2.29E-02	mg/kg	3.00E-02	mg/kg	3.00E-02	mg/kg	3.43E-02	mg/kg	2.80E-02	mg/kg
	Zinc	2.93E+01	mg/kg	1.74E+01	mg/kg	7.34E+00	mg/kg	6.84E+00	mg/kg	1.25E+01	mg/kg	1.47E+01	mg/kg

Definitions
COPC - chemical of potential concern, CTE - central tendency exposure, DF - dioxin/furan, KM - Kaplan-Meier, mgkg - milligram per kilogram, NDL-PCB - nondioxin-like PCB, PCB - polychlorinated biphenyl,
RME - reasonable maximum exposure, TEQ - toxicity equivalence

Notes
Statistics were calculated using ProUCL version 5.1.
(1) Consistent with risk assessment guidance, the exposure point concentration used to evaluate RME is also used to evaluate CTE.

*For consistency, if a chemical was identified as a COPC in any fish or crab tissue, it was retained as a COPC for all tissue types. Therefore, the COPC lists are identical for all types of biota.

TABLE 4-18
RAGS PART D TABLE 3.5: EXPOSURE POINT CONCENTRATION SUMMARY FOR CRAB - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration			
												Value (11)	Units	Statistic	Rationale
Biota															
	Dioxin-like Compounds														
	Crab	Hep + Muscle combined	2,3,7,8-TCDD	mg/kg	2.38E-05	(3)	2.63E-05	95% Student's-t UCL	--	4.49E-05	--	2.63E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,7,8-PeCDD	mg/kg	6.00E-07	(4)	6.91E-07	95% KM (t) UCL	--	1.26E-06	J	6.91E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,4,7,8-HxCDD	mg/kg	1.88E-07	(3)	2.00E-07	95% Student's-t UCL	--	2.94E-07	J	2.00E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,6,7,8-HxCDD	mg/kg	5.54E-07	(3)	5.91E-07	95% Student's-t UCL	--	8.85E-07	J	5.91E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,7,8,9-HxCDD	mg/kg	1.98E-07	(3)	2.10E-07	95% Student's-t UCL	--	2.88E-07	J	2.10E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,4,6,7,8-HpCDD	mg/kg	6.38E-07	(3)	6.80E-07	95% Student's-t UCL	--	9.38E-07	J	6.80E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	OCDD	mg/kg	1.77E-06	(3)	2.01E-06	95% Modified-t UCL	(10)	5.95E-06	J	2.01E-06	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	2,3,7,8-TCDF	mg/kg	9.14E-06	(3)	9.66E-06	95% Student's-t UCL	--	1.60E-05	J	9.66E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,7,8-PeCDF	mg/kg	1.97E-06	(3)	2.10E-06	95% Student's-t UCL	--	2.90E-06	J	2.10E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	2,3,4,7,8-PeCDF	mg/kg	4.50E-06	(3)	4.87E-06	95% Student's-t UCL	--	6.94E-06	J	4.87E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,4,7,8-HxCDF	mg/kg	4.05E-06	(3)	4.69E-06	95% Student's-t UCL	--	8.86E-06	J	4.69E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,6,7,8-HxCDF	mg/kg	1.27E-06	(3)	1.40E-06	95% Student's-t UCL	--	2.24E-06	J	1.40E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,7,8,9-HxCDF	mg/kg	8.02E-08	(3)	8.59E-08	95% Student's-t UCL	--	1.32E-07	J	8.59E-08	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	2,3,4,6,7,8-HxCDF	mg/kg	3.31E-07	(3)	3.70E-07	95% Adjusted Gamma UCL	--	6.05E-07	J	3.70E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,4,6,7,8-HpCDF	mg/kg	4.06E-06	(3)	4.68E-06	95% Student's-t UCL	--	9.54E-06	J	4.68E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	1,2,3,4,7,8,9-HpCDF	mg/kg	5.81E-08	(4)	6.65E-08	95% KM Adjusted Gamma UCL	(6)	1.41E-07	J	6.65E-08	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	OCDF	mg/kg	2.11E-07	(3)	2.44E-07	95% Modified-t UCL	(10)	5.78E-07	J	2.44E-07	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	KM TEQ DF	mg/kg	2.74E-05	(3)	3.02E-05	95% Student's-t UCL	--	4.98E-05	--	3.02E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-77	mg/kg	1.66E-03	(3)	1.95E-03	95% Student's-t UCL	--	2.51E-03	J	1.95E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-81	mg/kg	7.88E-05	(3)	8.52E-05	95% Student's-t UCL	--	1.42E-04	--	8.52E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-105	mg/kg	9.55E-03	(3)	1.04E-02	95% Student's-t UCL	--	1.57E-02	J	1.04E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-114	mg/kg	8.18E-04	(3)	8.80E-04	95% Student's-t UCL	--	1.39E-03	--	8.80E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-118	mg/kg	4.33E-02	(3)	4.66E-02	95% Student's-t UCL	--	6.89E-02	J	4.66E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-123	mg/kg	7.61E-04	(3)	8.18E-04	95% Student's-t UCL	--	1.25E-03	--	8.18E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-126	mg/kg	8.85E-05	(3)	9.66E-05	95% Student's-t UCL	--	1.58E-04	--	9.66E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-156/157	mg/kg	3.49E-03	(3)	3.73E-03	95% Student's-t UCL	--	5.34E-03	J	3.73E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-167	mg/kg	1.46E-03	(3)	1.55E-03	95% Student's-t UCL	--	2.26E-03	J	1.55E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-169	mg/kg	4.36E-06	(4)	1.09E-05	95% KM Chebyshev UCL	(7)	5.49E-05	J	1.09E-05	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	PCB-189	mg/kg	2.48E-04	(3)	2.68E-04	95% Student's-t UCL	--	4.04E-04	--	2.68E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	KM TEQ PCB	mg/kg	1.06E-05	(3)	1.16E-05	95% Student's-t UCL	--	1.88E-05	--	1.16E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Non-DL PCBs														
	Crab	Hep + Muscle combined	Total Non-DL PCBs	mg/kg	2.97E-01	(3)	3.20E-01	95% Student's-t UCL	--	4.91E-01	J	3.20E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	PAHs														
	Crab	Hep + Muscle combined	Benz(a)anthracene	mg/kg	2.73E-03	(4)	2.81E-03	95% KM (t) UCL	--	1.30E-02	U	2.81E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Benzo(a)pyrene	mg/kg	2.63E-03	(4)	2.69E-03	95% KM (t) UCL	--	1.30E-02	U	2.69E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Benzo(b)fluoranthene	mg/kg	2.61E-03	(4)	2.62E-03	95% KM (t) UCL	--	1.30E-02	U	2.62E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Chrysene	mg/kg	3.18E-03	(4)	3.66E-03	95% KM (BCA) UCL	(10)	1.30E-02	U	3.66E-03	mg/kg	95% KM (BCA) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Dibenz(a,h)anthracene	mg/kg	2.62E-03	(4)	2.65E-03	95% KM (t) UCL	--	1.30E-02	U	2.65E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Indeno(1,2,3-c,d)-pyrene	mg/kg	9.73E-03	(4)	2.14E-02	95% KM (t) UCL	(10)	1.37E-01	J	2.14E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Pesticides & Organics									--	--				
	Crab	Hep + Muscle combined	2,4'-DDD	mg/kg	1.06E-04	(4)	2.18E-04	95% KM Chebyshev UCL	(7)	8.92E-04	--	2.18E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	2,4'-DDE	mg/kg	2.29E-04	(4)	4.47E-04	95% KM Chebyshev UCL	--	1.72E-03	--	4.47E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	2,4'-DDT	mg/kg	7.75E-05	(4)	1.97E-04	95% KM Chebyshev UCL	(7)	1.03E-03	--	1.97E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	4,4'-DDD	mg/kg	2.90E-02	(3)	3.49E-02	95% Adjusted Gamma UCL	--	1.34E-01	J	3.49E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	4,4'-DDE	mg/kg	8.31E-02	(3)	9.40E-02	95% Adjusted Gamma UCL	--	1.91E-01	J	9.40E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	4,4'-DDT	mg/kg	5.36E-04	(3)	1.08E-03	95% Chebyshev (Mean, Sd) UCL	--	3.67E-03	J	1.08E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Benzaldehyde	mg/kg	1.00E+00	(4)	1.19E+00	95% KM (t) UCL	--	2.31E+00	J	1.19E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Chlordane, alpha (cis)	mg/kg	1.76E-03	(3)	2.03E-03	95% Student's-t UCL	--	3.85E-03	--	2.03E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Chlordane, gamma (trans)	mg/kg	2.25E-04	(4)	2.54E-04	95% KM (t) UCL	--	4.29E-04	J	2.54E-04	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Dieldrin	mg/kg	5.47E-03	(3)	6.13E-03	95% Student's-t UCL	--	9.38E-03	J	6.13E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Heptachlor epoxide, cis-	mg/kg	3.20E-03	(3)	3.58E-03	95% Adjusted Gamma UCL	--	1.05E-02	J	3.58E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Heptachlor epoxide, trans-	mg/kg	1.04E-03	(3)	1.15E-03	95% Student's-t UCL	--	2.54E-03	--	1.15E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Hexachlorobenzene	mg/kg	9.86E-04	(3)	1.10E-03	95% Student's-t UCL	--	2.46E-03	J	1.10E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Mirex	mg/kg	1.89E-04	(3)	2.01E-04	95% Student's-t UCL	--	2.87E-04	J	2.01E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Nonachlor, cis-	mg/kg	4.82E-03	(3)	5.27E-03	95% Student's-t UCL	--	1.15E-02	J	5.27E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Nonachlor, trans-	mg/kg	9.19E-03	(3)	1.04E-02	95% Student's-t UCL	--	2.37E-02	J	1.04E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Oxychlordane	mg/kg	1.41E-02	(3)	1.56E-02	95% Modified-t UCL	(10)	3.45E-02	J	1.56E-02	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Pyridine	mg/kg	4.11E-01	(4)	5.05E-01	95% KM (t) UCL	--	1.64E+00	U	5.05E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Inorganics														
	Crab	Hep + Muscle combined	Aluminum	mg/kg	7.64E+00	(4)	9.17E+00	95% KM (BCA) UCL	(10)	2.78E+01	J	9.17E+00	mg/kg	95% KM (BCA) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Arsenic, organic	mg/kg	2.37E+00	(3)	2.53E+00	95% Student's-t UCL	--	3.59E+00	--	2.53E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Arsenic, inorganic	mg/kg	2.64E-01	(3)	2.81E-01	95% Student's-t UCL	--	3.99E-01	--	2.81E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Cadmium	mg/kg	3.40E-01	(3)	3.98E-01	95% Adjusted Gamma UCL	--	8.11E-01	J	3.98E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Chromium [as Cr(III)]	mg/kg	1.41E-01	(4)	1.66E-01	95% KM (BCA) UCL	(10)	4.83E-01	J	1.66E-01	mg/kg	95% KM (BCA) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Cobalt	mg/kg	7.82E-02	(3)	8.90E-02	95% Modified-t UCL	(10)	2.33E-01	--	8.90E-02	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Copper	mg/kg	2.64E+01	(3)	2.86E+01	95% Adjusted Gamma UCL	--	5.50E+01	--	2.86E+01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Iron	mg/kg	2.54E+01	(3)	3.88E+01	95% Chebyshev (Mean, Sd) UCL	(7)	9.95E+01	--	3.88E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Lead	mg/kg	1.51E-01	(3)	2.81E-01	95% Chebyshev (Mean, Sd) UCL	(7)	9.04E-01	--	2.81E-01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Manganese	mg/kg	6.02E+00	(3)	9.90E+00	95% Chebyshev (Mean, Sd) UCL	(7)	2.70E+01	--	9.90E+00	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Mercury	mg/kg	1.43E-01	(3)	1.52E-01	95% Student's-t UCL	--	2.24E-01	--	1.52E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Methyl Mercury	mg/kg	1.57E-01	(3)	1.72E-01	95% Student's-t UCL	--	2.67E-01	--	1.72E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Selenium	mg/kg	1.08E+00	(3)	1.13E+00	95% Student's-t UCL	--	1.43E+00	--	1.13E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum

TABLE 4-18
RAGS PART D TABLE 3.5: EXPOSURE POINT CONCENTRATION SUMMARY FOR CRAB - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (11)	Units	Statistic	Rationale
Biota															
	Crab	Hep + Muscle combined	Silver	mg/kg	7.09E-01	(3)	7.81E-01	95% Student's-t UCL	--	1.60E+00	--	7.81E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Vanadium	mg/kg	6.56E-02	(4)	7.33E-02	95% KM (t) UCL	(10)	1.61E-01	--	7.33E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hep + Muscle combined	Zinc	mg/kg	4.44E+01	(3)	4.66E+01	95% Student's-t UCL	--	5.80E+01	--	4.66E+01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Dioxin-like Compounds														
	Crab	Muscle	2,3,7,8-TCDD	mg/kg	3.21E-06	(3)	3.86E-06	95% Adjusted Gamma UCL	--	8.53E-06	--	3.86E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,7,8-PeCDD	mg/kg	1.50E-07	(4)	2.50E-07	95% KM Chebyshev UCL	--	5.32E-07	J	2.50E-07	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,4,7,8-HxCDD	mg/kg	2.35E-08	(4)	2.74E-08	95% KM (t) UCL	--	4.64E-08	J	2.74E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,6,7,8-HxCDD	mg/kg	5.99E-08	(4)	6.92E-08	95% KM (t) UCL	--	1.39E-07	J	6.92E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,7,8,9-HxCDD	mg/kg	3.03E-08	(4)	3.55E-08	95% KM (t) UCL	--	6.50E-08	J	3.55E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,4,6,7,8-HpCDD	mg/kg	1.21E-07	(3)	1.34E-07	95% Student's-t UCL	--	2.39E-07	J	1.34E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	OCDD	mg/kg	4.14E-07	(3)	4.62E-07	95% Adjusted Gamma UCL	--	8.69E-07	J	4.62E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	2,3,7,8-TCDF	mg/kg	1.04E-06	(3)	1.15E-06	95% Student's-t UCL	--	2.30E-06	J	1.15E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,7,8-PeCDF	mg/kg	2.40E-07	(3)	2.70E-07	95% Student's-t UCL	--	5.14E-07	J	2.70E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	2,3,4,7,8-PeCDF	mg/kg	3.95E-07	(4)	4.82E-07	95% KM Adjusted Gamma UCL	(6)	9.76E-07	J	4.82E-07	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,4,7,8-HxCDF	mg/kg	4.50E-07	(3)	7.14E-07	95% Chebyshev (Mean, Sd) UCL	(7)	1.26E-06	J	7.14E-07	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,6,7,8-HxCDF	mg/kg	1.19E-07	(3)	1.81E-07	95% Chebyshev (Mean, Sd) UCL	(7)	3.34E-07	J	1.81E-07	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,7,8,9-HxCDF	mg/kg	6.56E-08	(3)	7.09E-08	95% Student's-t UCL	--	9.47E-08	J	7.09E-08	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	2,3,4,6,7,8-HxCDF	mg/kg	4.05E-08	(4)	4.60E-08	95% KM (t) UCL	--	8.58E-08	J	4.60E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,4,6,7,8-HpCDF	mg/kg	3.17E-07	(3)	3.92E-07	95% Adjusted Gamma UCL	--	8.81E-07	J	3.92E-07	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	1,2,3,4,7,8,9-HpCDF	mg/kg	2.91E-08	(4)	3.37E-08	95% KM (t) UCL	--	6.08E-08	J	3.37E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	OCDF	mg/kg	8.33E-08	(4)	9.33E-08	95% KM (t) UCL	--	1.73E-07	J	9.33E-08	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	KM TEQ DF	mg/kg	3.66E-06	(3)	4.39E-06	95% Adjusted Gamma UCL	--	9.63E-06	--	4.39E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-77	mg/kg	1.65E-04	(3)	1.99E-04	95% Student's-t UCL	--	3.60E-04	--	1.99E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	PCB-81	mg/kg	7.70E-06	(4)	9.03E-06	95% KM Adjusted Gamma UCL	(6)	1.54E-05	J	9.03E-06	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-105	mg/kg	8.74E-04	(3)	1.06E-03	95% Adjusted Gamma UCL	--	3.20E-03	J	1.06E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-114	mg/kg	7.48E-05	(4)	9.27E-05	95% KM Adjusted Gamma UCL	(6)	2.81E-04	--	9.27E-05	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-118	mg/kg	3.27E-03	(3)	3.96E-03	95% Adjusted Gamma UCL	--	1.23E-02	J	3.96E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-123	mg/kg	6.65E-05	(3)	7.85E-05	95% Student's-t UCL	--	2.21E-04	--	7.85E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	PCB-126	mg/kg	7.15E-06	(4)	8.48E-06	95% KM (t) UCL	--	2.26E-05	J	8.48E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	PCB-156/157	mg/kg	2.61E-04	(3)	3.21E-04	95% Adjusted Gamma UCL	--	1.31E-03	--	3.21E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-167	mg/kg	1.00E-04	(3)	1.23E-04	95% Adjusted Gamma UCL	--	4.54E-04	--	1.23E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	PCB-169	mg/kg	--	(1)	--	--	(1)	1.14E-05	U	1.14E-05	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	PCB-189	mg/kg	1.23E-05	(4)	1.57E-05	95% KM Adjusted Gamma UCL	(6)	4.58E-05	J	1.57E-05	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	KM TEQ PCB	mg/kg	8.56E-07	(3)	1.02E-06	95% Student's-t UCL	--	2.85E-06	J	1.02E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Non-DL PCBs														
	Crab	Muscle	Total Non-DL PCBs	mg/kg	2.31E-02	(3)	2.76E-02	95% Adjusted Gamma UCL	--	5.73E-02	J	2.76E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	PAHs														
	Crab	Muscle	Benz(a)anthracene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Benzo(a)pyrene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Benzo(b)fluoranthene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Chrysene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Dibenz(a,h)anthracene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Indeno(1,2,3-c,d)-pyrene	mg/kg	--	(1)	--	--	(1)	1.30E-02	U	1.30E-02	mg/kg	Maximum	Maximum used because 95% UCL not available
	Pesticides & Organics														
	Crab	Muscle	2,4'-DDD	mg/kg	1.58E-05	(4)	2.40E-05	95% KM Adjusted Gamma UCL	(6)	1.05E-04	--	2.40E-05	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	2,4'-DDE	mg/kg	3.12E-05	(4)	4.84E-05	95% KM Chebyshev UCL	(7)	1.23E-04	--	4.84E-05	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	2,4'-DDT	mg/kg	1.67E-05	(4)	3.72E-05	95% KM Chebyshev UCL	(7)	1.74E-04	--	3.72E-05	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	4,4'-DDD	mg/kg	4.34E-03	(3)	5.17E-03	95% Adjusted Gamma UCL	--	1.43E-02	J	5.17E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	4,4'-DDE	mg/kg	1.29E-02	(3)	1.46E-02	95% Student's-t UCL	--	3.31E-02	J	1.46E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	4,4'-DDT	mg/kg	9.77E-05	(4)	1.51E-04	95% KM Chebyshev UCL	(7)	3.54E-04	J	1.51E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	Benzaldehyde	mg/kg	--	(2)	--	--	(2)	1.30E+00	U	1.30E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Chlordane, alpha (cis)	mg/kg	3.72E-04	(4)	5.83E-04	95% KM Chebyshev UCL	(7)	1.59E-03	--	5.83E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	Chlordane, gamma (trans)	mg/kg	2.22E-05	(4)	2.64E-05	95% KM (t) UCL	--	6.22E-05	--	2.64E-05	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	Dieldrin	mg/kg	1.18E-03	(3)	1.35E-03	95% Adjusted Gamma UCL	--	2.66E-03	--	1.35E-03	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	Heptachlor epoxide, cis-	mg/kg	2.20E-04	(3)	3.27E-04	95% Chebyshev (Mean, Sd) UCL	--	6.40E-04	--	3.27E-04	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Muscle	Heptachlor epoxide, trans-	mg/kg	1.89E-04	(4)	2.26E-04	95% KM Adjusted Gamma UCL	(6)	4.80E-04	--	2.26E-04	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	Hexachlorobenzene	mg/kg	1.94E-04	(3)	2.21E-04	95% Adjusted Gamma UCL	--	4.12E-04	J	2.21E-04	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	Mirex	mg/kg	4.42E-05	(4)	5.07E-05	95% KM (t) UCL	--	1.19E-04	--	5.07E-05	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	Nonachlor, cis-	mg/kg	5.84E-04	(3)	6.58E-04	95% Student's-t UCL	--	1.17E-03	--	6.58E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Nonachlor, trans-	mg/kg	9.68E-04	(4)	1.20E-03	95% KM Adjusted Gamma UCL	(6)	2.38E-03	--	1.20E-03	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Muscle	Oxychlordane	mg/kg	1.47E-03	(3)	1.70E-03	95% Student's-t UCL	(5)	3.63E-03	--	1.70E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Pyridine	mg/kg	3.23E-01	(4)	4.14E-01	95% KM (t) UCL	--	1.30E+00	U	4.14E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Inorganics														
	Crab	Muscle	Aluminum	mg/kg	--	(2)	--	--	(2)	5.60E+00	U	5.60E+00	mg/kg	Maximum	Maximum used because 95% UCL not available
	Crab	Muscle	Arsenic, organic	mg/kg	2.20E+00	(3)	2.36E+00	95% Student's-t UCL	--	3.43E+00	--	2.36E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Arsenic, inorganic	mg/kg	2.45E-01	(3)	2.62E-01	95% Student's-t UCL	--	3.81E-01	--	2.62E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Cadmium	mg/kg	8.94E-02	(4)	1.64E-01	95% KM (t) UCL	(10)	9.33E-01	--	1.64E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	Chromium [as Cr(III)]	mg/kg	1.25E-01	(4)	1.52E-01	95% KM (t) UCL	--	5.44E-01	--	1.52E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	Cobalt	mg/kg	3.17E-02	(4)	7.04E-02	95% KM Chebyshev UCL	--	2.59E-01	--	7.04E-02	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	Copper	mg/kg	1.54E+01	(3)	1.83E+01	95% Modified-t UCL	(10)	6.22E+01	--	1.83E+01	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Muscle	Iron	mg/kg	1.16E+01	(4)	1.87E+01	95% KM Chebyshev UCL	--	4.51E+01	--	1.87E+01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	Lead	mg/kg	5.53E-02	(4)	9.65E-02	95% KM Chebyshev UCL	--	3.36E-01	--	9.65E-02	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Muscle	Manganese	mg/kg	4.81E+00	(3)	6.14E+00	95% Adjusted Gamma UCL	--	3.51E+01	--	6.14E+00	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum

TABLE 4-18
RAGS PART D TABLE 3.5: EXPOSURE POINT CONCENTRATION SUMMARY FOR CRAB - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration Value (11)	Units	Statistic	Rationale
Biota															
	Crab	Muscle	Mercury	mg/kg	1.69E-01	(3)	1.81E-01	95% Student's-t UCL	--	2.84E-01	--	1.81E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Methyl Mercury	mg/kg	1.94E-01	(3)	2.13E-01	95% Student's-t UCL	--	3.33E-01	--	2.13E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Selenium	mg/kg	8.67E-01	(3)	9.29E-01	95% Student's-t UCL	--	1.61E+00	--	9.29E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Muscle	Silver	mg/kg	3.82E-01	(3)	4.76E-01	95% Modified-t UCL	(10)	1.81E+00	--	4.76E-01	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Muscle	Vanadium	mg/kg	3.62E-02	(4)	4.26E-02	95% KM (t) UCL	(10)	1.58E-01	--	4.26E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Muscle	Zinc	mg/kg	4.49E+01	(3)	4.75E+01	95% Student's-t UCL	--	6.50E+01	--	4.75E+01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Dioxin-like Compounds														
	Crab	Hepatopancreas	2,3,7,8-TCDD	mg/kg	8.23E-05	(3)	9.11E-05	95% Student's-t UCL	--	1.65E-04	--	9.11E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,7,8-PeCDD	mg/kg	1.87E-06	(4)	2.17E-06	95% KM (t) UCL	--	3.38E-06	J	2.17E-06	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,4,7,8-HxCDD	mg/kg	6.47E-07	(3)	6.94E-07	95% Student's-t UCL	--	1.04E-06	J	6.94E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,6,7,8-HxCDD	mg/kg	1.96E-06	(3)	2.09E-06	95% Student's-t UCL	--	3.20E-06	J	2.09E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,7,8,9-HxCDD	mg/kg	6.66E-07	(3)	7.12E-07	95% Student's-t UCL	--	1.01E-06	J	7.12E-07	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,4,6,7,8-HpCDD	mg/kg	2.11E-06	(3)	2.26E-06	95% Student's-t UCL	--	3.25E-06	J	2.26E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	OCDD	mg/kg	5.63E-06	(3)	6.46E-06	95% Modified-t UCL	(10)	2.04E-05	J	6.46E-06	mg/kg	95% Modified-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	2,3,7,8-TCDF	mg/kg	3.22E-05	(3)	3.43E-05	95% Student's-t UCL	--	5.87E-05	J	3.43E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,7,8-PeCDF	mg/kg	6.90E-06	(3)	7.37E-06	95% Student's-t UCL	--	1.06E-05	J	7.37E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	2,3,4,7,8-PeCDF	mg/kg	1.62E-05	(3)	1.75E-05	95% Student's-t UCL	--	2.42E-05	J	1.75E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,4,7,8-HxCDF	mg/kg	1.43E-05	(3)	1.66E-05	95% Student's-t UCL	--	3.05E-05	J	1.66E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,6,7,8-HxCDF	mg/kg	4.54E-06	(3)	5.01E-06	95% Student's-t UCL	--	8.32E-06	J	5.01E-06	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,7,8,9-HxCDF	mg/kg	1.19E-07	(4)	1.36E-07	95% KM Adjusted Gamma UCL	(6)	3.12E-07	J	1.36E-07	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	2,3,4,6,7,8-HxCDF	mg/kg	1.15E-06	(3)	1.30E-06	95% Adjusted Gamma UCL	--	2.09E-06	J	1.30E-06	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,4,6,7,8-HpCDF	mg/kg	1.47E-05	(3)	1.70E-05	95% Student's-t UCL	--	3.52E-05	J	1.70E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	1,2,3,4,7,8,9-HpCDF	mg/kg	1.11E-07	(4)	1.37E-07	95% KM (t) UCL	--	3.68E-07	J	1.37E-07	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	OCDF	mg/kg	5.74E-07	(3)	8.38E-07	95% Chebyshev (Mean, Sd) UCL	(7)	1.77E-06	J	8.38E-07	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	KM TEQ DF	mg/kg	9.50E-05	(3)	1.05E-04	95% Student's-t UCL	--	1.83E-04	--	1.05E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-77	mg/kg	5.95E-03	(3)	6.88E-03	95% Student's-t UCL	--	9.49E-03	J	6.88E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-81	mg/kg	2.81E-04	(3)	3.05E-04	95% Student's-t UCL	--	5.07E-04	--	3.05E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-105	mg/kg	3.43E-02	(3)	3.72E-02	95% Student's-t UCL	--	5.57E-02	J	3.72E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-114	mg/kg	2.93E-03	(3)	3.16E-03	95% Student's-t UCL	--	4.96E-03	--	3.16E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-118	mg/kg	1.57E-01	(3)	1.69E-01	95% Student's-t UCL	--	2.48E-01	J	1.69E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-123	mg/kg	2.74E-03	(3)	2.95E-03	95% Student's-t UCL	--	4.43E-03	--	2.95E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-126	mg/kg	3.20E-04	(4)	3.50E-04	95% KM (t) UCL	--	5.70E-04	--	3.50E-04	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-156/157	mg/kg	1.27E-02	(3)	1.35E-02	95% Student's-t UCL	--	1.95E-02	J	1.35E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-167	mg/kg	5.32E-03	(3)	5.68E-03	95% Student's-t UCL	--	8.18E-03	J	5.68E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-169	mg/kg	1.16E-05	(4)	3.63E-05	95% KM Chebyshev UCL	--	2.07E-04	--	3.63E-05	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	PCB-189	mg/kg	9.20E-04	(3)	9.92E-04	95% Student's-t UCL	--	1.48E-03	--	9.92E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	KM TEQ PCB	mg/kg	3.81E-05	(3)	4.19E-05	95% Student's-t UCL	--	6.76E-05	--	4.19E-05	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Non-DL PCBs														
	Crab	Hepatopancreas	Total Non-DL PCBs	mg/kg	1.09E+00	(3)	1.17E+00	95% Student's-t UCL	--	1.76E+00	J	1.17E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	PAHs														
	Crab	Hepatopancreas	Benz(a)anthracene	mg/kg	2.98E-03	(4)	3.23E-03	95% KM (t) UCL	--	1.30E-02	U	3.23E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Benzo(a)pyrene	mg/kg	2.69E-03	(4)	2.84E-03	95% KM (t) UCL	(10)	1.30E-02	U	2.84E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Benzo(b)fluoranthene	mg/kg	2.62E-03	(4)	2.67E-03	95% KM (t) UCL	--	1.30E-02	U	2.67E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Chrysene	mg/kg	3.75E-03	(4)	4.48E-03	95% KM Adjusted Gamma UCL	(6)	1.40E-02	J	4.48E-03	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Dibenz(a,h)anthracene	mg/kg	2.65E-03	(4)	2.76E-03	95% KM (t) UCL	--	1.30E-02	U	2.76E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Indeno(1,2,3-c,d)-pyrene	mg/kg	3.00E-02	(4)	7.51E-02	95% KM (t) UCL	(10)	5.20E-01	J	7.51E-02	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Pesticides & Organics														
	Crab	Hepatopancreas	2,4'-DDD	mg/kg	3.62E-04	(4)	7.58E-04	95% KM Chebyshev UCL	(7)	3.13E-03	--	7.58E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	2,4'-DDE	mg/kg	7.92E-04	(4)	1.59E-03	95% KM Chebyshev UCL	(7)	6.27E-03	--	1.59E-03	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	2,4'-DDT	mg/kg	2.47E-04	(4)	6.53E-04	95% KM Chebyshev UCL	(7)	3.47E-03	--	6.53E-04	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	4,4'-DDD	mg/kg	9.92E-02	(3)	1.21E-01	95% Adjusted Gamma UCL	--	4.75E-01	J	1.21E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	4,4'-DDE	mg/kg	2.83E-01	(3)	3.23E-01	95% Adjusted Gamma UCL	--	6.70E-01	J	3.23E-01	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	4,4'-DDT	mg/kg	1.75E-03	(3)	3.72E-03	95% Chebyshev (Mean, Sd) UCL	--	1.31E-02	J	3.72E-03	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Benzaldehyde	mg/kg	2.09E+00	(4)	2.54E+00	95% KM (t) UCL	--	5.20E+00	--	2.54E+00	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Chlordane, alpha (cis)	mg/kg	5.72E-03	(4)	6.62E-03	95% KM (t) UCL	--	1.15E-02	--	6.62E-03	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Chlordane, gamma (trans)	mg/kg	7.96E-04	(4)	9.02E-04	95% KM (t) UCL	--	1.61E-03	--	9.02E-04	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Dieldrin	mg/kg	1.78E-02	(3)	2.02E-02	95% Student's-t UCL	--	3.40E-02	J	2.02E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Heptachlor epoxide, cis-	mg/kg	1.17E-02	(3)	1.31E-02	95% Adjusted Gamma UCL	--	3.88E-02	J	1.31E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Heptachlor epoxide, trans-	mg/kg	3.45E-03	(3)	3.84E-03	95% Student's-t UCL	--	8.76E-03	--	3.84E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Hexachlorobenzene	mg/kg	3.24E-03	(3)	3.63E-03	95% Student's-t UCL	--	8.58E-03	J	3.63E-03	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Mirex	mg/kg	6.19E-04	(3)	6.66E-04	95% Student's-t UCL	--	1.16E-03	J	6.66E-04	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Nonachlor, cis-	mg/kg	1.69E-02	(3)	1.85E-02	95% Student's-t UCL	--	4.09E-02	J	1.85E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Nonachlor, trans-	mg/kg	3.26E-02	(3)	3.73E-02	95% Adjusted Gamma UCL	--	8.54E-02	J	3.73E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Oxychlordane	mg/kg	5.00E-02	(3)	5.54E-02	95% Adjusted Gamma UCL	--	1.24E-01	J	5.54E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Pyridine	mg/kg	6.01E-01	(4)	7.94E-01	95% KM (t) UCL	--	2.60E+00	U	7.94E-01	mg/kg	95% KM (t) UCL	95% UCL less than maximum
	Inorganics														
	Crab	Hepatopancreas	Aluminum	mg/kg	1.37E+01	(4)	2.82E+01	95% KM Chebyshev UCL	(7)	9.16E+01	--	2.82E+01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Arsenic, organic	mg/kg	2.86E+00	(3)	3.12E+00	95% Student's-t UCL	--	5.54E+00	--	3.12E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Arsenic, inorganic	mg/kg	3.18E-01	(3)	3.46E-01	95% Student's-t UCL	--	6.16E-01	--	3.46E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Cadmium	mg/kg	1.04E+00	(4)	1.27E+00	95% KM Adjusted Gamma UCL	(6)	2.99E+00	--	1.27E+00	mg/kg	95% KM Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Chromium [as Cr(III)]	mg/kg	1.78E-01	(4)	2.84E-01	95% KM Chebyshev UCL	--	7.36E-01	--	2.84E-01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Cobalt	mg/kg	2.08E-01	(3)	2.24E-01	95% Student's-t UCL	--	3.71E-01	--	2.24E-01	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Copper	mg/kg	5.73E+01	(3)	7.50E+01	95% Chebyshev (Mean, Sd) UCL	--	1.27E+02	--	7.50E+01	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum

TABLE 4-18
RAGS PART D TABLE 3.5: EXPOSURE POINT CONCENTRATION SUMMARY FOR CRAB - RME AND CTE SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Scenario Timeframe: Current/Future
Medium: Crab
Exposure Medium: Crab

Exposure Point	Matrix	Tissue	Chemical of Potential Concern *See Note Below	Units	Arithmetic Mean	Arithmetic Mean Note	95% UCL	95% UCL Distribution	95% UCL Distribution Note	Maximum Concentration	Maximum Concentration Qualifier	Exposure Point Concentration			
												Value (11)	Units	Statistic	Rationale
Biota															
	Crab	Hepatopancreas	Iron	mg/kg	6.41E+01	(3)	1.01E+02	95% Chebyshev (Mean, Sd) UCL	--	2.77E+02	--	1.01E+02	mg/kg	95% Chebyshev (Mean, Sd) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Lead	mg/kg	4.11E-01	(4)	8.17E-01	95% KM Chebyshev UCL	(7)	2.52E+00	--	8.17E-01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Manganese	mg/kg	9.28E+00	(4)	1.85E+01	95% KM Chebyshev UCL	--	5.28E+01	--	1.85E+01	mg/kg	95% KM Chebyshev UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Mercury	mg/kg	6.85E-02	(3)	7.49E-02	95% Adjusted Gamma UCL	--	1.34E-01	--	7.49E-02	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Methyl Mercury	mg/kg	5.32E-02	(3)	5.90E-02	95% Student's-t UCL	--	1.13E-01	--	5.90E-02	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Selenium	mg/kg	1.70E+00	(3)	1.82E+00	95% Student's-t UCL	--	2.58E+00	--	1.82E+00	mg/kg	95% Student's-t UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Silver	mg/kg	1.63E+00	(3)	1.91E+00	95% Adjusted Gamma UCL	--	3.87E+00	--	1.91E+00	mg/kg	95% Adjusted Gamma UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Vanadium	mg/kg	1.47E-01	(4)	1.71E-01	95% KM (BCA) UCL	(5)	4.49E-01	--	1.71E-01	mg/kg	95% KM (BCA) UCL	95% UCL less than maximum
	Crab	Hepatopancreas	Zinc	mg/kg	4.25E+01	(3)	4.76E+01	95% Modified-t UCL	(5)	8.24E+01	--	4.76E+01	mg/kg	95% Modified-t UCL	95% UCL less than maximum

Definitions
COPC - chemical of potential concern, CTE - central tendency exposure, DF - dioxin/furan, J - estimated value, KM - Kaplan-Meier, mgkg - milligram per kilogram, NDL-PCB - nondioxin-like PCB, PCB - polychlorinated biphenyl, RME - reasonable maximum exposure, TEQ - toxicity equivalence, U - not detected, UCL - upper confidence limit on the mean

Notes
Statistics were calculated using ProUCL version 5.1.
(1) Mean and 95% UCL could not be calculated because all samples were non-detects.
(2) Mean and 95% UCL could not be calculated because there was only one distinct detected value.
(3) Arithmetic mean reported because detection frequency was 100%.
(4) Kaplan-Meier mean reported because detection frequency was less than 100%, but (1) and (2) did not apply.
(5) Pro-UCL's maximum suggested UCL was an H-UCL. The second-greatest suggested UCL was substituted.
(6) ProUCL's maximum suggested UCL was a GROS Adjusted Gamma UCL. The second-greatest suggested UCL was substituted.
(7) Pro-UCL's maximum suggested UCL was an H-UCL. The 95% Chebyshev UCL was substituted.
(8) Pro-UCL's maximum suggested UCL was a 99% UCL. The 95% Chebyshev UCL was substituted.
(9) Pro-UCL's maximum suggested UCL was a 97.5% UCL. The 95% Chebyshev UCL was substituted.
(10) Pro-UCL suggested more than one 95% UCL distribution; the greatest of the suggested 95% UCL values is reported here.
(11) Consistent with risk assessment guidance, the exposure point concentration used to evaluate RME is also used to evaluate CTE.

*For consistency, if a chemical was identified as a COPC in any fish or crab tissue, it was retained as a COPC for all tissue types. Therefore, the COPC lists are identical for all types of biota.

TABLE 5-1
RAGS PART D TABLE 5.1: NON-CANCER TOXICITY DATA FOR COPCS – ORAL/DERMAL
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern (1)	CAS Number	Chronic/ Subchronic	Oral RfD		TEF	Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Modifying/Uncertainty Factors	RfD:Target Organ(s)					
			Value (2)	Units	(3)	(4)	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)	Toxicity Factor Tier (5)	Surrogate	CAS for Surrogate	Rationale/ Ref for Surrogate
Dioxin-like Compounds																
2,3,7,8-TCDD	1746-01-6	Chronic	7.0E-10	mg/kg-day	1	1	7.0E-10	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	--	--	--
1,2,3,7,8-PeCDD	40321-76-4	Chronic	7.0E-10	mg/kg-day	1	1	7.0E-10	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,7,8-HxCDD	39227-28-6	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,6,7,8-HxCDD	57653-85-7	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,7,8,9-HxCDD	19408-74-3	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,6,7,8-HpCDD	35822-46-9	Chronic	7.0E-08	mg/kg-day	0.01	1	7.0E-08	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
OCDD	3268-87-9	Chronic	2.3E-06	mg/kg-day	0.0003	1	2.3E-06	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
2,3,7,8-TCDF	51207-31-9	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,7,8-PeCDF	57117-41-6	Chronic	2.3E-08	mg/kg-day	0.03	1	2.3E-08	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
2,3,4,7,8-PeCDF	57117-31-4	Chronic	2.3E-09	mg/kg-day	0.3	1	2.3E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,7,8-HxCDF	70648-26-9	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,6,7,8-HxCDF	57117-44-9	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,7,8,9-HxCDF	72918-21-9	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
2,3,4,6,7,8-HxCDF	60851-34-5	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,6,7,8-HpCDF	67562-39-4	Chronic	7.0E-08	mg/kg-day	0.01	1	7.0E-08	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,7,8,9-HpCDF	55673-89-7	Chronic	7.0E-08	mg/kg-day	0.01	1	7.0E-08	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
OCDF	39001-02-0	Chronic	2.3E-06	mg/kg-day	0.0003	1	2.3E-06	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
KM TEQ DF	--	Chronic	7.0E-10	mg/kg-day	1	1	7.0E-10	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	2,3,7,8-TCDD	1746-01-6	AECOM 2017
PCB-77	32598-13-3	Chronic	7.0E-06	mg/kg-day	0.0001	1	7.0E-06	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-81	70362-50-4	Chronic	2.3E-06	mg/kg-day	0.0003	1	2.3E-06	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-105	32598-14-4	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-114	74472-37-0	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-118	31508-00-6	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-123	65510-44-3	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-126	57465-28-8	Chronic	7.0E-09	mg/kg-day	0.1	1	7.0E-09	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-156/157	--	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-167	52663-72-6	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-169	32774-16-6	Chronic	2.3E-08	mg/kg-day	0.03	1	2.3E-08	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-189	39635-31-9	Chronic	2.3E-05	mg/kg-day	0.00003	1	2.3E-05	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
KM TEQ PCB	--	Chronic	7.0E-10	mg/kg-day	1	1	7.0E-10	mg/kg-day	Reproductive	1/30	IRIS/ WHO TEF	2/17/2012	Tier 1	2,3,7,8-TCDD	1746-01-6	AECOM 2017
Non DL-PCBs																
Total Non-DL PCBs (RME)	1336-36-3	Chronic	2.0E-05	mg/kg-day	--	1	2.0E-05	mg/kg-day	Whole Body	1/300	IRIS	10/1/1994	Tier 1	Aroclor 1254	11097-69-1	Battelle 2018a, AECOM 2017
Total Non-DL PCBs (CTE)	1336-36-3	Chronic	2.0E-05	mg/kg-day	--	1	2.0E-05	mg/kg-day	Whole Body	1/300	IRIS	10/1/1994	Tier 1	Aroclor 1254	11097-69-1	Same RfD as for RME
PAHs																
Benz(a)anthracene	56-55-3	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--

TABLE 5-1
RAGS PART D TABLE 5.1: NON-CANCER TOXICITY DATA FOR COPCS – ORAL/DERMAL
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern (1)	CAS Number	Chronic/ Subchronic	Oral RfD Value (2)	Oral RfD Units	TEF (3)	Oral Absorption Efficiency for Dermal (4)	Absorbed RfD for Dermal Value	Absorbed RfD for Dermal Units	Primary Target Organ(s)	Modifying/Uncertainty Factors	RfD:Target Organ(s) Source(s)	RfD:Target Organ(s) Date(s) (MM/DD/YYYY)	Toxicity Factor Tier (5)	Surrogate	CAS for Surrogate	Rationale/ Ref for Surrogate
Benzo(a)pyrene	50-32-8	Chronic	3.0E-04	mg/kg-day	--	1	3.0E-04	mg/kg-day	Developmental	1/300	IRIS	1/19/2017	Tier 1	--	--	--
Benzo(b)fluoranthene	205-99-2	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	207-08-9	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Chrysene	218-01-9	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	53-70-3	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)-pyrene	193-39-5	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Naphthalene	91-20-3	Chronic	2.0E-02	mg/kg-day	--	1	2.0E-02	mg/kg-day	Body Weight	1/3000	IRIS	9/17/1998	Tier 1	--	--	--
Pesticides & Organics																
2,4'-DDD	53-19-0	Chronic	3.0E-05	mg/kg-day	--	1	3.0E-05	mg/kg-day	Liver	1/300	PPRTV SCREEN	9/20/2017	Tier 3	4,4'-DDD	72-54-8	Battelle 2018a
2,4'-DDE	3424-82-6	Chronic	3.0E-04	mg/kg-day	--	1	3.0E-04	mg/kg-day	Liver	1/3000	PPRTV SCREEN	9/26/2017	Tier 3	4,4'-DDE	72-55-9	Battelle 2018a
2,4'-DDT	789-02-6	Chronic	5.0E-04	mg/kg-day	--	1	5.0E-04	mg/kg-day	Liver	1/100	IRIS	3/31/1987	Tier 1	4,4'-DDT	50-29-3	Battelle 2018a
4,4'-DDD	72-54-8	Chronic	3.0E-05	mg/kg-day	--	1	3.0E-05	mg/kg-day	Liver	1/300	PPRTV SCREEN	9/20/2017	Tier 3	--	--	--
4,4'-DDE	72-55-9	Chronic	3.0E-04	mg/kg-day	--	1	3.0E-04	mg/kg-day	Liver	1/3000	PPRTV SCREEN	9/26/2017	Tier 3	--	--	--
4,4'-DDT	50-29-3	Chronic	5.0E-04	mg/kg-day	--	1	5.0E-04	mg/kg-day	Liver	1/100	IRIS	3/31/1987	Tier 1	--	--	--
Aldrin	309-00-2	Chronic	3.0E-05	mg/kg-day	--	1	3.0E-05	mg/kg-day	Liver	1/1000	IRIS	3/31/1987	Tier 1	--	--	--
Benzaldehyde	100-52-7	Chronic	1.0E-01	mg/kg-day	--	1	1.0E-01	mg/kg-day	GI Tract, Kidney	1/1000	IRIS	9/7/1988	Tier 1	--	--	--
Chlordane, alpha (cis)	5103-71-9	Chronic	5.0E-04	mg/kg-day	--	1	5.0E-04	mg/kg-day	Liver	1/300	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a, AECOM 2017
Chlordane, gamma (trans)	5103-74-2	Chronic	5.0E-04	mg/kg-day	--	1	5.0E-04	mg/kg-day	Liver	1/300	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a, AECOM 2017
Chloroform	67-66-3	Chronic	1.0E-02	mg/kg-day	--	1	1.0E-02	mg/kg-day	Liver	1/100	IRIS	10/19/2001	Tier 1	--	--	--
Dieldrin	60-57-1	Chronic	5.0E-05	mg/kg-day	--	1	5.0E-05	mg/kg-day	Liver	1/100	IRIS	9/7/1988	Tier 1	--	--	--
Heptachlor	76-44-8	Chronic	5.0E-04	mg/kg-day	--	1	5.0E-04	mg/kg-day	Liver	1/300	IRIS	9/30/1987	Tier 1	--	--	--
Heptachlor epoxide, cis-	1024-57-3	Chronic	1.3E-05	mg/kg-day	--	1	1.3E-05	mg/kg-day	Liver	1/1000	IRIS	9/30/1987	Tier 1	--	--	--
Heptachlor epoxide, trans-	28044-83-9	Chronic	1.3E-05	mg/kg-day	--	1	1.3E-05	mg/kg-day	Liver	1/1000	IRIS	9/30/1987	Tier 1	Heptachlor epoxide	1024-57-3	Battelle 2018a
Hexachlorobenzene	118-74-1	Chronic	8.0E-04	mg/kg-day	--	1	8.0E-04	mg/kg-day	Liver	1/100	IRIS	9/26/1988	Tier 1	--	--	--
Mirex	2385-85-5	Chronic	2.0E-04	mg/kg-day	--	1	2.0E-04	mg/kg-day	Liver, Thyroid	1/300	IRIS	10/1/1992	Tier 1	--	--	--
Nonachlor, cis-	5103-73-1	Chronic	1.0E-04	mg/kg-day	--	1	1.0E-04	mg/kg-day	Liver	1/300	IRIS	2/7/1998	Tier 1	Value for chlordane with RPF applied	12789-03-6	Battelle 2018a,b, USEPA 2015
Nonachlor, trans-	39765-80-5	Chronic	1.6E-05	mg/kg-day	--	1	1.6E-05	mg/kg-day	Liver	1/300	IRIS	2/7/1998	Tier 1	Value for chlordane with RPF applied	12789-03-6	Battelle 2018a,b, USEPA 2015
Oxychlordane	27304-13-8	Chronic	8.9E-05	mg/kg-day	--	1	8.9E-05	mg/kg-day	Liver	1/300	IRIS	2/7/1998	Tier 1	Value for chlordane with RPF applied	12789-03-6	Battelle 2018a,b, USEPA 2015
PHC as gasoline	--	Chronic	4.0E-03	mg/kg-day	--	1	4.0E-03	mg/kg-day	Blood, Immune	1/300	PPRTV	9/30/2009	Tier 2	Total Petroleum Hydrocarbons (Aromatic Low)	E1790672	Surrogate chosen by GSH. Typical hydrocarbon chain lengths in gasoline are C4-C12 (ATSDR 1999), which is within the low carbon range for TPH (USEPA 2009). The TPH aromatic low fraction was selected, as it has more conservative toxicity factors than the TPH aliphatic low fraction (USEPA 2009)
Pyridine	110-86-1	Chronic	1.0E-03	mg/kg-day	--	1	1.0E-03	mg/kg-day	Liver	1/1000	IRIS	9/30/1987	Tier 1	--	--	--
TPH (C9-C40)	--	Chronic	4.0E-03	mg/kg-day	--	1	4.0E-03	mg/kg-day	Respiratory	1/1,000	PPRTV	9/30/2009	Tier 2	Total Petroleum Hydrocarbons (Aromatic Medium)	E1790674	Surrogate chosen by GSH. C9-C40 encompasses medium and high carbon range TPH fractions (USEPA 2009). The TPH aromatic medium fraction was selected, as it has the most conservative toxicity factors of the medium and high aromatic and aliphatic fractions (USEPA 2009)
Trichloroethylene	79-01-6	Chronic	5.0E-04	mg/kg-day	--	1	5.0E-04	mg/kg-day	Thymus, Blood, Immune, Developmental	1/10-1000	IRIS	9/28/2011	Tier 1	--	--	--
Inorganics																
Aluminum	7429-90-5	Chronic	1.0E+00	mg/kg-day	--	1	1.0E+00	mg/kg-day	Neurological	1/100	PPRTV	10/23/2006	Tier 2	--	--	--
Antimony	7440-36-0	Chronic	4.0E-04	mg/kg-day	--	0.15	6.0E-05	mg/kg-day	Whole Body	1/1000	IRIS	1/31/1987	Tier 1	--	--	--
Arsenic, organic	7440-38-2	Chronic	2.0E-02	mg/kg-day	--	1	2.0E-02	mg/kg-day	Urinary	1/100	ATSDR MRL	8/31/2007	Tier 3	Dimethylarsinic acid	75-60-5	AECOM 2017
Arsenic, inorganic	7440-38-2	Chronic	3.0E-04	mg/kg-day	--	1	3.0E-04	mg/kg-day	Skin, Blood	1/3	IRIS	9/1/1991	Tier 1	--	--	--
Cadmium (diet)	7440-43-9	Chronic	1.0E-03	mg/kg-day	--	0.025	2.5E-05	mg/kg-day	Urinary	1/10	IRIS	10/1/1989	Tier 1	--	--	--
Chromium [as Cr(III)]	7440-47-3	Chronic	1.5E+00	mg/kg-day	--	0.013	2.0E-02	mg/kg-day	No Effect	10/100	IRIS	9/3/1998	Tier 1	--	--	--

TABLE 5-1
RAGS PART D TABLE 5.1: NON-CANCER TOXICITY DATA FOR COPCS – ORAL/DERMAL
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern	CAS Number	Chronic/ Subchronic	Oral RfD		TEF	Oral Absorption Efficiency for Dermal	Absorbed RfD for Dermal		Primary Target Organ(s)	Modifying/Uncertainty Factors	RfD:Target Organ(s)					
(1)			Value (2)	Units	(3)	(4)	Value	Units			Source(s)	Date(s) (MM/DD/YYYY)	Toxicity Factor Tier (5)	Surrogate	CAS for Surrogate	Rationale/ Ref for Surrogate
Chromium (VI)	18540-29-9	Chronic	3.0E-03	mg/kg-day	--	0.025	7.5E-05	mg/kg-day	No Effect	3/300	IRIS	9/3/1998	Tier 1	--	--	--
Cobalt	7440-48-4	Chronic	3.0E-04	mg/kg-day	--	1	3.0E-04	mg/kg-day	Thyroid	1/3000	PPRTV	8/25/2008	Tier 2	--	--	--
Copper	7440-50-8	Chronic	4.0E-02	mg/kg-day	--	1	4.0E-02	mg/kg-day	GI Tract	NA/NA	HEAST	7/1/1997	Tier 3	--	--	--
Iron	7439-89-6	Chronic	7.0E-01	mg/kg-day	--	1	7.0E-01	mg/kg-day	GI Tract	1/1.5	PPRTV	9/11/2006	Tier 2	--	--	--
Lead	7439-92-1	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--
Manganese (diet)	7439-96-5	Chronic	1.4E-01	mg/kg-day	--	1	1.4E-01	mg/kg-day	Neurological	1/1	IRIS	11/1/1995	Tier 1	--	--	--
Manganese (non-diet)	7439-96-5	Chronic	2.4E-02	mg/kg-day	--	0.04	9.6E-04	mg/kg-day	Neurological	1/1	IRIS	11/1/1995	Tier 1	--	--	--
Mercury	7439-97-6	Chronic	3.0E-04	mg/kg-day	--	0.07	2.1E-05	mg/kg-day	Immune	1/1000	IRIS	5/1/1995	Tier 1	Mercuric Chloride	7487-94-7	AECOM 2017
Methyl Mercury	22967-92-6	Chronic	1.0E-04	mg/kg-day	--	1	1.0E-04	mg/kg-day	Neurological	1/10	IRIS	7/27/2001	Tier 1	--	--	--
Nickel	7440-02-0	Chronic	2.0E-02	mg/kg-day	--	0.04	8.0E-04	mg/kg-day	Body Weight, Organ Weights	1/300	IRIS	12/1/1991	Tier 1	Nickel Soluble Salts	7440-02-0	Surrogate chosen by GSH; representative compounds
Selenium	7782-49-2	Chronic	5.0E-03	mg/kg-day	--	1	5.0E-03	mg/kg-day	Whole Body	1/3	IRIS	6/1/1991	Tier 1	--	--	--
Silver	7440-22-4	Chronic	5.0E-03	mg/kg-day	--	0.04	2.0E-04	mg/kg-day	Skin	1/3	IRIS	12/1/1991	Tier 1	--	--	--
Thallium	7440-28-0	Chronic	1.0E-05	mg/kg-day	--	1	1.0E-05	mg/kg-day	Skin, Hair	1/3000	PPRTV SCREEN	11/1/2012	Tier 3	Thallium Soluble Salts	7440-28-0	Battelle 2018a, AECOM 2017
Titanium	7440-32-6	--	--	--	--	1	--	--	--	--	--	--	--	Titanium Tetrachloride	7550-45-0	AECOM 2017
Vanadium	7440-62-2	Chronic	5.0E-03	mg/kg-day	--	0.026	1.3E-04	mg/kg-day	Hair	1/100	IRIS	6/30/1988	Tier 1	--	--	--
Zinc	7440-66-6	Chronic	3.0E-01	mg/kg-day	--	1	3.0E-01	mg/kg-day	Blood	1/3	IRIS	8/3/2005	Tier 1	--	--	--

Abbreviations

ATSDR - Agency for Toxic Substances and Disease Registry, CAS - Chemical Abstract Service number, CTE - central tendency exposure, GSH - Glenn Springs Holdings, HEAST - Health Effects Assessment Tables, IRIS - Integrated Risk Information System, LPRSA - Lower Passaic River Study Area, mg/kg-day - milligram per kilogram per day, MRL - minimal risk level, PAH - polycyclic aromatic hydrocarbon, PHC - petroleum hydrocarbon, PPRTV - Provisional Peer-Reviewed Toxicity Value, PPRTV Screen - PPRTV appendix toxicity screening value, Ref - reference, RfD - reference dose, RME - reasonable maximum exposure, RPF - relative potency factor, TEF - toxic equivalency factor, TPH - total petroleum hydrocarbon, USEPA - US Environmental Protection Agency, WHO - World Health Organization

Notes

(1) PCB-156 and PCB-157 coelute; the CAS number applies to PCB-156. Lead was evaluated using the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) Model (USEPA 1994) or USEPA's Adult Lead Methodology (Bowers et al. 1994 Model, USEPA 2003b).

(2) The EPA IRIS file states that the chloroform RfD is also protective against cancer risk. Per IRIS, a modifying factor of 3 should be applied to the manganese RfD when calculating risks associated with non-food sources, and dietary exposure (5 mg) should be subtracted. Thus, the IRIS RfD for dietary manganese has been lowered by a factor of 2 x 3, or 6, for non-dietary manganese. The vanadium RfD is derived from the IRIS RfD for vanadium pentoxide by factoring out the molecular weight of the oxide ion. Cis-nonachlor, trans-nonachlor, and oxychlordane RfDs are based on RPFs applied to the chlordane RfD. The RPFs applied are: 4.8 (cis-nonachlor), 32.2 (trans-nonachlor), and 5.6 (oxychlordane) (AECOM 2017, Battelle 2018b).

(2) and (3) The dioxin-like assessment incorporates the WHO TEF approach described in Van den Berg et al. 2006 and adopted by USEPA (2010). The RfDs for dioxin-like compounds were calculated by dividing the 2,3,7,8-TCDD RfD by the TEF.

(4) Oral absorption efficiency values were obtained from RAGS Part E, USEPA Supplemental Guidance for Dermal Risk Assessment (USEPA 2004). The oral RfD was multiplied by the oral absorption factor to calculate the dermal RfD. Where no adjustment is recommended, the dermal RfD = oral RfD.

(5) Toxicity factor tier based on USEPA's toxicity value hierarchy (USEPA 2003a).

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TABLE 5-2
RAGS PART D TABLE 6.1: CANCER TOXICITY DATA FOR COPCS – ORAL/DERMAL
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern (1)	CAS Number	Oral Cancer Slope Factor Value (2)	Oral Cancer Slope Factor Units	TEF (3)	RPF (4)	Oral Absorption Efficiency for Dermal (5)	Absorbed Cancer Slope Factor for Dermal Value	Absorbed Cancer Slope Factor for Dermal Units	Mutagen (6)	Weight of Evidence/ Cancer Guideline Description	Weight of Evidence Classification System (7)	Oral CSF Source(s)	Oral CSF Date(s) (MM/DD/YYYY)	Toxicity Factor Tier (8)	Surrogate	CAS for Surrogate	Rationale/ Ref for Surrogate
Dioxin-like Compounds																	
2,3,7,8-TCDD	1746-01-6	1.5E+05	(mg/kg-day)-1	1	--	1	1.5E+05	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	--	--	--
1,2,3,7,8-PeCDD	40321-76-4	1.5E+05	(mg/kg-day)-1	1	--	1	1.5E+05	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,7,8-HxCDD	39227-28-6	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,6,7,8-HxCDD	57653-85-7	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,7,8,9-HxCDD	19408-74-3	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,6,7,8-HpCDD	35822-46-9	1.5E+03	(mg/kg-day)-1	0.01	--	1	1.5E+03	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
OCDD	3268-87-9	4.5E+01	(mg/kg-day)-1	0.0003	--	1	4.5E+01	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
2,3,7,8-TCDF	51207-31-9	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,7,8-PeCDF	57117-41-6	4.5E+03	(mg/kg-day)-1	0.03	--	1	4.5E+03	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
2,3,4,7,8-PeCDF	57117-31-4	4.5E+04	(mg/kg-day)-1	0.3	--	1	4.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,7,8-HxCDF	70648-26-9	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,6,7,8-HxCDF	57117-44-9	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,7,8,9-HxCDF	72918-21-9	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
2,3,4,6,7,8-HxCDF	60851-34-5	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,6,7,8-HpCDF	67562-39-4	1.5E+03	(mg/kg-day)-1	0.01	--	1	1.5E+03	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
1,2,3,4,7,8,9-HpCDF	55673-89-7	1.5E+03	(mg/kg-day)-1	0.01	--	1	1.5E+03	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
OCDF	39001-02-0	4.5E+01	(mg/kg-day)-1	0.0003	--	1	4.5E+01	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
KM TEQ DF	--	1.5E+05	(mg/kg-day)-1	1	--	1	1.5E+05	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	2,3,7,8-TCDD	1746-01-6	AECOM 2017
PCB-77	32598-13-3	1.5E+01	(mg/kg-day)-1	0.0001	--	1	1.5E+01	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-81	70362-50-4	4.5E+01	(mg/kg-day)-1	0.0003	--	1	4.5E+01	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-105	32598-14-4	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-114	74472-37-0	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-118	31508-00-6	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-123	65510-44-3	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-126	57465-28-8	1.5E+04	(mg/kg-day)-1	0.1	--	1	1.5E+04	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-156/157	--	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-167	52663-72-6	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-169	32774-16-6	4.5E+03	(mg/kg-day)-1	0.03	--	1	4.5E+03	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
PCB-189	39635-31-9	4.5E+00	(mg/kg-day)-1	0.00003	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	Value for 2,3,7,8-TCDD with TEF applied	1746-01-6	AECOM 2017
KM TEQ PCB	--	1.5E+05	(mg/kg-day)-1	1	--	1	1.5E+05	(mg/kg-day)-1	No	B2	1986	HEAST/ WHO TEF	7/31/1997	Tier 3	2,3,7,8-TCDD	1746-01-6	AECOM 2017
Non-DL PCBs																	
Total Non-DL PCBs (RME)	1336-36-3	2.0E+00	(mg/kg-day)-1	--	--	1	2.0E+00	(mg/kg-day)-1	No	B2	1986	IRIS	10/1/1996	Tier 1	Polychlorinated Biphenyls (high risk and persistence, upper-bound slope factor)	1336-36-3	Battelle 2018a, AECOM 2017
Total Non-DL PCBs (CTE)	1336-36-3	1.0E+00	(mg/kg-day)-1	--	--	1	1.0E+00	(mg/kg-day)-1	No	B2	1986	IRIS	10/1/1996	Tier 1	Polychlorinated Biphenyls (high risk and persistence, central-estimate slope factor)	1336-36-3	Battelle 2018b
PAHs																	
Benz(a)anthracene	56-55-3	1.0E-01	(mg/kg-day)-1	--	0.1	1	1.0E-01	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	Value for Benzo(a)pyrene with RPF applied	50-32-8	Battelle 2018a, AECOM 2017
Benzo(a)pyrene	50-32-8	1.0E+00	(mg/kg-day)-1	--	1.0	1	1.0E+00	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	--	--	--
Benzo(b)fluoranthene	205-99-2	1.0E-01	(mg/kg-day)-1	--	0.10	1	1.0E-01	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	Value for Benzo(a)pyrene with RPF applied	50-32-8	Battelle 2018a, AECOM 2017

TABLE 5-2
RAGS PART D TABLE 6.1: CANCER TOXICITY DATA FOR COPCS – ORAL/DERMAL
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern (1)	CAS Number	Oral Cancer Slope Factor Value (2)	Oral Cancer Slope Factor Units	TEF (3)	RPF (4)	Oral Absorption Efficiency for Dermal (5)	Absorbed Cancer Slope Factor for Dermal Value	Absorbed Cancer Slope Factor for Dermal Units	Mutagen (6)	Weight of Evidence/ Cancer Guideline Description	Weight of Evidence Classification System (7)	Oral CSF Source(s)	Oral CSF Date(s) (MM/DD/YYYY)	Toxicity Factor Tier (8)	Surrogate	CAS for Surrogate	Rationale/ Ref for Surrogate
Benzo(k)fluoranthene	207-08-9	1.0E-02	(mg/kg-day)-1	--	0.01	1	1.0E-02	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	Value for Benzo(a)pyrene with RPF applied	50-32-8	Battelle 2018a, AECOM 2017
Chrysene	218-01-9	1.0E-03	(mg/kg-day)-1	--	0.001	1	1.0E-03	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	Value for Benzo(a)pyrene with RPF applied	50-32-8	Battelle 2018a, AECOM 2017
Dibenz(a,h)anthracene	53-70-3	1.0E+00	(mg/kg-day)-1	--	1.0	1	1.0E+00	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	Value for Benzo(a)pyrene with RPF applied	50-32-8	Battelle 2018a, AECOM 2017
Indeno(1,2,3-c,d)-pyrene	193-39-5	1.0E-01	(mg/kg-day)-1	--	0.1	1	1.0E-01	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	1/19/2017	Tier 1	Value for Benzo(a)pyrene with RPF applied	50-32-8	Battelle 2018a, AECOM 2017
Naphthalene	91-20-3	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Pesticides & Organics																	
2,4'-DDD	53-19-0	2.4E-01	(mg/kg-day)-1	--	--	1	2.4E-01	(mg/kg-day)-1	No	B2	1986	IRIS	8/22/1988	Tier 1	4,4'-DDD	72-54-8	Battelle 2018a
2,4'-DDE	3424-82-6	3.4E-01	(mg/kg-day)-1	--	--	1	3.4E-01	(mg/kg-day)-1	No	B2	1986	IRIS	8/22/1988	Tier 1	4,4'-DDE	72-55-9	Battelle 2018a
2,4'-DDT	789-02-6	3.4E-01	(mg/kg-day)-1	--	--	1	3.4E-01	(mg/kg-day)-1	No	B2	1986	IRIS	8/22/1988	Tier 1	4,4'-DDT	50-29-3	Battelle 2018a
4,4'-DDD	72-54-8	2.4E-01	(mg/kg-day)-1	--	--	1	2.4E-01	(mg/kg-day)-1	No	B2	1986	IRIS	8/22/1988	Tier 1	--	--	--
4,4'-DDE	72-55-9	3.4E-01	(mg/kg-day)-1	--	--	1	3.4E-01	(mg/kg-day)-1	No	B2	1986	IRIS	8/22/1988	Tier 1	--	--	--
4,4'-DDT	50-29-3	3.4E-01	(mg/kg-day)-1	--	--	1	3.4E-01	(mg/kg-day)-1	No	B2	1986	IRIS	8/22/1988	Tier 1	--	--	--
Aldrin	309-00-2	1.7E+01	(mg/kg-day)-1	--	--	1	1.7E+01	(mg/kg-day)-1	No	B2	1986	IRIS	9/30/1987	Tier 1	--	--	--
Benzaldehyde	100-52-7	4.0E-03	(mg/kg-day)-1	--	--	1	4.0E-03	(mg/kg-day)-1	No	Some evidence of carcinogenicity in animals	2005	PPRTV	11/12/2015	Tier 2	--	--	--
Chlordane, alpha (cis)	5103-71-9	3.5E-01	(mg/kg-day)-1	--	--	1	3.5E-01	(mg/kg-day)-1	No	B2	1986	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a, AECOM 2017
Chlordane, gamma (trans)	5103-74-2	3.5E-01	(mg/kg-day)-1	--	--	1	3.5E-01	(mg/kg-day)-1	No	B2	1986	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a, AECOM 2017
Chloroform	67-66-3	3.1E-02	(mg/kg-day)-1	--	--	1	3.1E-02	(mg/kg-day)-1	No	B2	1986	Cal EPA	1/20/2011	Tier 3	--	--	--
Dieldrin	60-57-1	1.6E+01	(mg/kg-day)-1	--	--	1	1.6E+01	(mg/kg-day)-1	No	B2	1986	IRIS	9/7/1988	Tier 1	--	--	--
Heptachlor	76-44-8	4.5E+00	(mg/kg-day)-1	--	--	1	4.5E+00	(mg/kg-day)-1	No	B2	1986	IRIS	9/30/1987	Tier 1	--	--	--
Heptachlor epoxide, cis-	1024-57-3	9.1E+00	(mg/kg-day)-1	--	--	1	9.1E+00	(mg/kg-day)-1	No	B2	1986	IRIS	9/30/1987	Tier 1	--	--	--
Heptachlor epoxide, trans-	28044-83-9	9.1E+00	(mg/kg-day)-1	--	--	1	9.1E+00	(mg/kg-day)-1	No	B2	1986	IRIS	9/30/1987	Tier 1	Heptachlor epoxide	1024-57-3	Battelle 2018a
Hexachlorobenzene	118-74-1	1.6E+00	(mg/kg-day)-1	--	--	1	1.6E+00	(mg/kg-day)-1	No	B2	1986	IRIS	3/1/1991	Tier 1	--	--	--
Mirex	2385-85-5	1.8E+01	(mg/kg-day)-1	--	--	1	1.8E+01	(mg/kg-day)-1	No	NA	Not assessed under IRIS	Cal EPA	4/1/1992	Tier 3	--	--	--
Nonachlor, cis-	5103-73-1	3.5E-01	(mg/kg-day)-1	--	--	1	3.5E-01	(mg/kg-day)-1	No	B2	1986	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a,b, USEPA 2015
Nonachlor, trans-	39765-80-5	3.5E-01	(mg/kg-day)-1	--	--	1	3.5E-01	(mg/kg-day)-1	No	B2	1986	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a,b, USEPA 2015
Oxychlordane	27304-13-8	3.5E-01	(mg/kg-day)-1	--	--	1	3.5E-01	(mg/kg-day)-1	No	B2	1986	IRIS	2/7/1998	Tier 1	Chlordane	12789-03-6	Battelle 2018a,b, USEPA 2015
PHC as gasoline	--	--	--	--	--	1	--	--	No	--	--	--	--	--	Total Petroleum Hydrocarbons (Aromatic Low)	E1790672	Surrogate chosen by GSH. Typical hydrocarbon chain lengths in gasoline are C4-C12 (ATSDR 1999), which is within the low carbon range for TPH (USEPA 2009). The TPH aromatic low fraction was selected, as it has more conservative toxicity factors than the TPH aliphatic low fraction (USEPA 2009)
Pyridine	110-86-1	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
TPH (C9-C40)	--	--	--	--	--	1	--	--	No	--	--	--	--	--	Total Petroleum Hydrocarbons (Aromatic Medium)	E1790674	Surrogate chosen by GSH. C9-C40 encompasses medium and high carbon range TPH fractions (USEPA 2009). The TPH aromatic medium fraction was selected, as it has the most conservative toxicity factors of the medium and high aromatic and aliphatic fractions (USEPA 2009)
Trichloroethylene	79-01-6	4.6E-02	(mg/kg-day)-1	--	--	1	4.6E-02	(mg/kg-day)-1	Yes	Carcinogenic to humans	2005	IRIS	9/28/2011	Tier 1	--	--	--
Inorganics																	
Aluminum	7429-90-5	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Antimony	7440-36-0	--	--	--	--	0.15	--	--	No	--	--	--	--	--	--	--	--
Arsenic, organic	7440-38-2	--	--	--	--	1	--	--	No	--	--	--	--	--	Dimethylarsinic acid	75-60-5	AECOM 2017
Arsenic, inorganic	7440-38-2	1.5E+00	(mg/kg-day)-1	--	--	1	1.5E+00	(mg/kg-day)-1	No	A	1986	IRIS	6/1/1995	Tier 1	--	--	--
Cadmium (diet)	7440-43-9	--	--	--	--	0.025	--	--	No	--	--	--	--	--	--	--	--
Chromium [as Cr(III)]	7440-47-3	--	--	--	--	0.013	--	--	No	NA	Not assessed under IRIS	--	9/3/1998	--	--	--	--
Chromium (VI)	18540-29-9	5.0E-01	(mg/kg-day)-1	--	--	0.025	2.0E+01	(mg/kg-day)-1	Yes	D (oral); A (inhalation)	1986	NJDEP	4/8/2009	Tier 3	--	--	--
Cobalt	7440-48-4	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Copper	7440-50-8	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Iron	7439-89-6	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Lead	7439-92-1	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Manganese (diet)	7439-96-5	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--

TABLE 5-2
RAGS PART D TABLE 6.1: CANCER TOXICITY DATA FOR COPCS – ORAL/DERMAL
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Chemical of Potential Concern (1)	CAS Number	Oral Cancer Slope Factor Value (2)	Oral Cancer Slope Factor Units	TEF (3)	RPF (4)	Oral Absorption Efficiency for Dermal (5)	Absorbed Cancer Slope Factor for Dermal Value	Absorbed Cancer Slope Factor for Dermal Units	Mutagen (6)	Weight of Evidence/ Cancer Guideline Description	Weight of Evidence Classification System (7)	Oral CSF Source(s)	Oral CSF Date(s) (MM/DD/YYYY)	Toxicity Factor Tier (8)	Surrogate	CAS for Surrogate	Rationale/ Ref for Surrogate
Manganese (non-diet)	7439-96-5	--	--	--	--	0.04	--	--	No	--	--	--	--	--	--	--	--
Mercury	7439-97-6	--	--	--	--	0.07	--	--	No	--	--	--	--	--	Mercuric Chloride	7487-94-7	AECOM 2017
Methyl Mercury	22967-92-6	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Nickel	7440-02-0	--	--	--	--	0.04	--	--	No	--	--	--	--	--	Nickel Soluble Salts	7440-02-0	Surrogate chosen by GSH; representative compounds
Selenium	7782-49-2	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--
Silver	7440-22-4	--	--	--	--	0.04	--	--	No	--	--	--	--	--	--	--	--
Thallium	7440-28-0	--	--	--	--	1	--	--	No	--	--	--	--	--	Thallium Soluble Salts	7440-28-0	Battelle 2018a, AECOM 2017
Titanium	7440-32-6	--	--	--	--	1	--	--	No	--	--	--	--	--	Titanium Tetrachloride	7550-45-0	AECOM 2017
Vanadium	7440-62-2	--	--	--	--	0.026	--	--	No	--	--	--	--	--	--	--	--
Zinc	7440-66-6	--	--	--	--	1	--	--	No	--	--	--	--	--	--	--	--

Abbreviations
ATSDR - Agency for Toxic Substances and Disease Registry, CAS - Chemical Abstract Service number, Cal EPA - California Environmental Protection Agency, CSF - cancer slope factor, GSH - Glenn Springs Holdings, HEAST - Health Effects Assessment Tables, IRIS - Integrated Risk Information System, (mg/kg-day)-1 - risk per milligram per kilogram per day, NA = not assessed, NJDEP - New Jersey Department of Environmental Protection, OEHHA - Office of Environmental Health Hazard Assessment, PAH - polycyclic aromatic hydrocarbon, PHC - petroleum hydrocarbon, PPRTV - Provisional Peer-Reviewed Toxicity Value, Ref - reference, RPF - relative potency factor, TEF - toxic equivalency factor, TPH - total petroleum hydrocarbon, USEPA - US Environmental Protection Agency, WHO - World Health Organization

Notes
(1) PCB-156 and PCB-157 coelute; the CAS number applies to PCB-156. Lead was evaluated using the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) model. Lead was evaluated using the USEPA Integrated Exposure Uptake Biokinetic (IEUBK) Model (USEPA 1994) or USEPA's Adult Lead Methodology (Bowers et al. 1994 Model, USEPA 2003b).
(2) and (3) The dioxin-like assessment incorporates the WHO TEF approach described in Van den Berg et al. 2006 and adopted by USEPA (2010). The CSFs for dioxin-like compounds were calculated by multiplying the 2,3,7,8-TCDD CSF by the TEF.
While some TPH fractions have cancer slope factors in USEPA (2009), EPA recommends that TPH be assessed in Superfund risk assessments only for potential noncancer health effects. Combining TPH and individual constituent cancer risks would be overly protective (USEPA 2018c). Therefore, consistent with AECOM (2017), cancer-based values are not used for PHC as gasoline and TPH (C9-C40).
(4) RPFs for the carcinogenic PAHs were obtained from USEPA 1993. The CSFs for these PAHs were calculated by multiplying the benzo-a-pyrene CSF by the RPF.
(6) Oral absorption efficiency values were obtained from RAGS Part E, USEPA Supplemental Guidance for Dermal Risk Assessment (USEPA 2004). The oral CSF was divided by the oral absorption factor to calculate the dermal CSF. Where no adjustment is recommended, the dermal CSF = oral CSF.
(5) Toxicity factor tier based on USEPA's toxicity value hierarchy (USEPA 2003a).
(6) Mutgenic designations were obtained from USEPA 2018c.
(7) Some chemicals are classified under the 1986 system, while others have been classified under the 2005 system:

1986 Classifications	2005 Classifications
Group A Carcinogenic to Humans	Carcinogenic - Carcinogenic to Humans
Group B Probably Carcinogenic to Humans	Likely Carcinogenic - Likely to be Carcinogenic to Humans
B1 Based on limited human evidence	Suggestive Evidence - Suggestive Evidence of Carcinogenic Potential
B2 Based on animal evidence	Inadequate Information - Inadequate Information to Assess Carcinogenic Potential
Group C Possibly Carcinogenic to Humans	Not Likely Carcinogenic - Not Likely to be Carcinogenic to Humans
Group D Not Classifiable as to Human Carcinogenicity	
Group E Evidence of Noncarcinogenicity for Humans	

(8) Toxicity Factor Tier based on USEPA's Toxicity Factor Hierarchy (USEPA 2003a).

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TABLE 5-3
AGE-DEPENDENT ADJUSTMENT FACTORS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

	Child	**Adolescent**	**Adult**
Receptor Age (yr)	**1-<7**	**7-<19**	**>18**
RME ED (yr)	6	12	20
CTE ED (yr)	3	6	9
Age Range	**ADAF**		
1<2	10	--	--
2<3	3	--	--
3<4	3	--	--
4<5	3	--	--
5<6	3	--	--
6<7	3	--	--
7<8	--	3	--
8<9	--	3	--
9<10	--	3	--
10<11	--	3	--
11<12	--	3	--
12<13	--	3	--
13<14	--	3	--
14<15	--	3	--
15<16	--	3	--
16<17	--	1	--
17<18	--	1	--
18<19	--	1	--
>19	--	--	1
RME ADAF (a,c)	**4.2**	**2.5**	**1**
CTE ADAF (b,c)	**3**	**2**	**1**

Notes:
ADAF - Age-dependent Adjustment Factor
CTE - Central Tendancy Exposure
ED - Exposure duration
RME - Reasonable Maximum Exposure

(a) The RME ADAF is the average of the ADAFs for the age groups for a certain exposure duration.
(b) The CTE ADAF is the average of the latter years of the receptor's exposure duration.
(c) For each intake equation, the ADAF was inserted as a factor in the numerator.

TABLE 6-1
SUMMARY OF CUMULATIVE SITEWIDE CANCER RISK FOR THE BOATER, SWIMMER, WADER, AND WORKER RECEPTORS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor		Medium	Potential Cancer Risk (d)	
			RME	CTE
Swimmer	Child	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-06	2E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-06	2E-07
		Surface Water (excluding KM TEQs) (a)	2E-07	4E-08
		Surface Water (based on KM TEQs) (b)	2E-07	4E-08
		Total without KM TEQ (a)	2E-06	2E-07
		Total with KM TEQ (b)	2E-06	2E-07
	Adolescent	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	3E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	3E-07
		Surface Water (excluding KM TEQs) (a)	5E-07	1E-07
		Surface Water (based on KM TEQs) (b)	5E-07	1E-07
		Total without KM TEQ (a)	3E-06	5E-07
		Total with KM TEQ (b)	2E-06	4E-07
	Adult	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-06	2E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-06	2E-07
		Surface Water (excluding KM TEQs) (a)	1E-07	2E-08
		Surface Water (based on KM TEQs) (b)	1E-07	2E-08
		Total without KM TEQ (a)	1E-06	2E-07
		Total with KM TEQ (b)	1E-06	2E-07
	Combined Adult/Child (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	3E-06	4E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	3E-07
		Surface Water (excluding KM TEQs) (a)	3E-07	5E-08
		Surface Water (based on KM TEQs) (b)	3E-07	5E-08
		Total without KM TEQ (a)	3E-06	4E-07
		Total with KM TEQ (b)	3E-06	4E-07
Wader	Child	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-06	2E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-06	2E-07
		Surface Water (excluding KM TEQs) (a)	3E-08	1E-08
		Surface Water (based on KM TEQs) (b)	3E-08	1E-08
		Total without KM TEQ (a)	2E-06	2E-07
		Total with KM TEQ (b)	1E-06	2E-07
	Adolescent	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	3E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	3E-07
		Surface Water (excluding KM TEQs) (a)	7E-08	8E-09
		Surface Water (based on KM TEQs) (b)	7E-08	7E-09
		Total without KM TEQ (a)	2E-06	4E-07
		Total with KM TEQ (b)	2E-06	4E-07
	Adult	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-06	2E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-06	2E-07
		Surface Water (excluding KM TEQs) (a)	1E-08	2E-09
		Surface Water (based on KM TEQs) (b)	1E-08	2E-09
		Total without KM TEQ (a)	1E-06	2E-07
		Total with KM TEQ (b)	1E-06	2E-07
	Combined Adult/Child (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	3E-06	4E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	3E-07
		Surface Water (excluding KM TEQs) (a)	5E-08	7E-09
		Surface Water (based on KM TEQs) (b)	5E-08	7E-09
		Total without KM TEQ (a)	3E-06	4E-07
		Total with KM TEQ (b)	3E-06	4E-07

TABLE 6-1
SUMMARY OF CUMULATIVE SITEWIDE CANCER RISK FOR THE BOATER, SWIMMER, WADER, AND WORKER RECEPTORS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor		Medium	Potential Cancer Risk (d)	
			RME	CTE
Boater	Adolescent	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	3E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	3E-07
		Surface Water (excluding KM TEQs) (a)	3E-07	8E-08
		Surface Water (based on KM TEQs) (b)	3E-07	8E-08
		Total without KM TEQ (a)	2E-06	4E-07
		Total with KM TEQ (b)	2E-06	4E-07
	Adult	Accessible Surface Sediment (excluding KM TEQs) (a)	4E-07	6E-08
		Accessible Surface Sediment (based on KM TEQs) (b)	4E-07	6E-08
		Surface Water (excluding KM TEQs) (a)	3E-07	5E-08
		Surface Water (based on KM TEQs) (b)	3E-07	5E-08
		Total without KM TEQ (a)	7E-07	1E-07
		Total with KM TEQ (b)	7E-07	1E-07
Worker (Adult)	Worker (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	3E-06	3E-07
		Accessible Surface Sediment (based on KM TEQs) (b)	3E-06	3E-07
		Total without KM TEQ (a)	3E-06	3E-07
		Total with KM TEQ (b)	3E-06	3E-07

Notes:

CTE - Central Tendency Exposure.

KM - Kaplan Meier

RME - Reasonable Maximum Exposure.

TEQ - Toxicity Equivalence.

(a) Cumulative cancer risks where TEQ calculated manually.

(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator

(c) Cancer risks for adult and child age groups summed to yield 26 year total exposure duration for RME and a 12 year exposure duration for CTE.

(d) Consistent with USEPA guidance (1989b), potential carcinogenic risks are presented using one significant figure. Based on standard practice for rounding numbers, risk estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and risk estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-2
SUMMARY OF CUMULATIVE SITEWIDE NONCANCER HAZARDS FOR THE BOATER, SWIMMER, WADER, AND WORKER RECEPTORS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor		Medium	Hazard Index (c)	
			RME	CTE
Swimmer	Child	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-01	4E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-01	4E-02
		Surface Water (excluding KM TEQs) (a)	9E-03	5E-03
		Surface Water (based on KM TEQs) (b)	9E-03	5E-03
		Total without KM TEQ (a)	2E-01	4E-02
		Total with KM TEQ (b)	1E-01	4E-02
	Adolescent	Accessible Surface Sediment (excluding KM TEQs) (a)	9E-02	3E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	9E-02	3E-02
		Surface Water (excluding KM TEQs) (a)	1E-02	7E-03
		Surface Water (based on KM TEQs) (b)	1E-02	7E-03
		Total without KM TEQ (a)	1E-01	4E-02
		Total with KM TEQ (b)	1E-01	4E-02
	Adult	Accessible Surface Sediment (excluding KM TEQs) (a)	3E-02	1E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	3E-02	1E-02
		Surface Water (excluding KM TEQs) (a)	3E-03	2E-03
		Surface Water (based on KM TEQs) (b)	3E-03	2E-03
		Total without KM TEQ (a)	3E-02	1E-02
		Total with KM TEQ (b)	3E-02	1E-02
Wader	Child	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-01	4E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-01	4E-02
		Surface Water (excluding KM TEQs) (a)	1E-03	4E-04
		Surface Water (based on KM TEQs) (b)	1E-03	4E-04
		Total without KM TEQ (a)	1E-01	4E-02
		Total with KM TEQ (b)	1E-01	4E-02
	Adolescent	Accessible Surface Sediment (excluding KM TEQs) (a)	9E-02	3E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	9E-02	3E-02
		Surface Water (excluding KM TEQs) (a)	2E-03	5E-04
		Surface Water (based on KM TEQs) (b)	2E-03	5E-04
		Total without KM TEQ (a)	9E-02	3E-02
		Total with KM TEQ (b)	9E-02	3E-02
	Adult	Accessible Surface Sediment (excluding KM TEQs) (a)	3E-02	1E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	3E-02	1E-02
		Surface Water (excluding KM TEQs) (a)	5E-04	1E-04
		Surface Water (based on KM TEQs) (b)	5E-04	1E-04
		Total without KM TEQ (a)	3E-02	1E-02
		Total with KM TEQ (b)	3E-02	1E-02
Boater	Adolescent	Accessible Surface Sediment (excluding KM TEQs) (a)	9E-02	3E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	9E-02	3E-02
		Surface Water (excluding KM TEQs) (a)	1E-02	5E-03
		Surface Water (based on KM TEQs) (b)	1E-02	5E-03
		Total without KM TEQ (a)	1E-01	3E-02
		Total with KM TEQ (b)	1E-01	3E-02
	Adult	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-02	4E-03
		Accessible Surface Sediment (based on KM TEQs) (b)	1E-02	4E-03
		Surface Water (excluding KM TEQs) (a)	9E-03	3E-03
		Surface Water (based on KM TEQs) (b)	9E-03	3E-03
		Total without KM TEQ (a)	2E-02	7E-03
		Total with KM TEQ (b)	2E-02	7E-03
Worker (Adult)	Worker (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	8E-02	3E-02
		Accessible Surface Sediment (based on KM TEQs) (b)	8E-02	3E-02
		Total without KM TEQ (a)	8E-02	3E-02
		Total with KM TEQ (b)	8E-02	3E-02

TABLE 6-2
SUMMARY OF CUMULATIVE SITEWIDE NONCANCER HAZARDS FOR THE BOATER, SWIMMER, WADER, AND WORKER RECEPTORS
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor		Medium	Hazard Index (c)	
			RME	CTE

Notes:

CTE - Central Tendency Exposure.

KM - Kaplan Meier

RME - Reasonable Maximum Exposure.

TEQ - Toxicity Equivalence.

(a) Cumulative cancer risks where TEQ calculated manually.

(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator

(c) Consistent with USEPA guidance (1989b), potential noncarcinogenic hazard indices are presented using one significant figure. Based on standard practice for rounding numbers, hazard estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and hazard estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-3
SUMMARY OF CUMULATIVE SITEWIDE CANCER RISKS FOR THE ANGLER/SPORTSMAN RECEPTOR - MIXED FISH DIET SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Potential Cancer Risk (d)	
		RME	CTE
Angler/Sportsman (Child)	Mixed Fish Diet (excluding KM TEQs)	3E-04	9E-06
	Mixed Fish Diet (based on KM TEQs)	3E-04	9E-06
	Total without KM TEQ (a)	3E-04	9E-06
	Total with KM TEQ (b)	3E-04	9E-06
Angler/Sportsman (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	4E-07
	Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	4E-07
	Surface Water (excluding KM TEQs) (a)	8E-08	9E-09
	Surface Water (based on KM TEQs) (b)	8E-08	9E-09
	Mixed Fish Diet (excluding KM TEQs)	3E-04	1E-05
	Mixed Fish Diet (based on KM TEQs)	3E-04	1E-05
	Total without KM TEQ (a)	3E-04	1E-05
	Total with KM TEQ (b)	3E-04	1E-05
Angler/Sportsman (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	4E-06	7E-07
	Accessible Surface Sediment (based on KM TEQs) (b)	4E-06	6E-07
	Surface Water (excluding KM TEQs) (a)	5E-08	6E-09
	Surface Water (based on KM TEQs) (b)	5E-08	6E-09
	Mixed Fish Diet (excluding KM TEQs)	5E-04	2E-05
	Mixed Fish Diet (based on KM TEQs)	5E-04	2E-05
	Total without KM TEQ (a)	5E-04	2E-05
	Total with KM TEQ (b)	6E-04	2E-05
Angler/Sportsman (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	4E-06	7E-07
	Accessible Surface Sediment (based on KM TEQs) (b)	4E-06	6E-07
	Surface Water (excluding KM TEQs) (a)	5E-08	6E-09
	Surface Water (based on KM TEQs) (b)	5E-08	6E-09
	Mixed Fish Diet (excluding KM TEQs)	8E-04	3E-05
	Mixed Fish Diet (based on KM TEQs)	8E-04	3E-05
	Total without KM TEQ (a)	8E-04	3E-05
	Total with KM TEQ (b)	8E-04	3E-05

Notes:
CTE - Central Tendency Exposure.
KM - Kaplan Meier
RME - Reasonable Maximum Exposure.
TEQ - Toxicity Equivalence.
(a) Cumulative cancer risks where TEQ calculated manually.
(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator
(c) Cancer risks for adult and child age groups summed to yield 26 year total exposure duration for RME and a 12 year exposure duration for CTE.
(d) Consistent with USEPA guidance (1989b), potential carcinogenic risks are presented using one significant figure. Based on standard practice for rounding numbers, risk estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and risk estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-4
SUMMARY OF CUMULATIVE SITEWIDE NONCANCER HAZARD FOR THE ANGLER/SPORTSMAN RECEPTOR - MIXED FISH DIET SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Hazard Index (c)	
		RME	CTE
Angler/Sportsman (Child)	Mixed Fish Diet (excluding KM TEQs)	4E+01	3E+00
	Mixed Fish Diet (based on KM TEQs)	4E+01	4E+00
	Total without KM TEQ (a)	4E+01	3E+00
	Total with KM TEQ (b)	4E+01	4E+00
Angler/Sportsman (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-01	4E-02
	Accessible Surface Sediment (based on KM TEQs) (b)	1E-01	4E-02
	Surface Water (excluding KM TEQs) (a)	3E-03	7E-04
	Surface Water (based on KM TEQs) (b)	2E-03	7E-04
	Mixed Fish Diet (excluding KM TEQs)	3E+01	2E+00
	Mixed Fish Diet (based on KM TEQs)	3E+01	2E+00
	Total without KM TEQ (a)	3E+01	2E+00
	Total with KM TEQ (b)	3E+01	2E+00
Angler/Sportsman (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	1E-01	4E-02
	Accessible Surface Sediment (based on KM TEQs) (b)	1E-01	4E-02
	Surface Water (excluding KM TEQs) (a)	2E-03	5E-04
	Surface Water (based on KM TEQs) (b)	2E-03	5E-04
	Mixed Fish Diet (excluding KM TEQs)	3E+01	2E+00
	Mixed Fish Diet (based on KM TEQs)	3E+01	2E+00
	Total without KM TEQ (a)	3E+01	2E+00
	Total with KM TEQ (b)	3E+01	2E+00

Notes:
CTE - Central Tendency Exposure.
KM - Kaplan Meier
RME - Reasonable Maximum Exposure.
TEQ - Toxicity Equivalence.
(a) Cumulative cancer risks where TEQ calculated manually.
(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator
(c) Consistent with USEPA guidance (1989b), potential noncarcinogenic hazard indices are presented using one significant figure. Based on standard practice for rounding numbers, hazard estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and hazard estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-5
SUMMARY OF CUMULATIVE SITEWIDE CANCER RISKS FOR THE ANGLER/SPORTSMAN RECEPTOR - CRAB CONSUMPTION SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Potential Cancer Risk (d)	
		RME	CTE
Angler/Sportsman (Child)	Crab Muscle & Hepatopancreas (excluding KM TEQs)	3E-04	2E-05
	Crab Muscle & Hepatopancreas (based on KM TEQs)	3E-04	2E-05
	Total without KM TEQ (a)	3E-04	2E-05
	Total with KM TEQ (b)	3E-04	2E-05
Angler/Sportsman (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	3E-07
	Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	3E-07
	Surface Water (excluding KM TEQs) (a)	5E-08	6E-09
	Surface Water (based on KM TEQs) (b)	5E-08	6E-09
	Crab Muscle & Hepatopancreas (excluding KM TEQs)	4E-04	2E-05
	Crab Muscle & Hepatopancreas (based on KM TEQs)	3E-04	2E-05
	Total without KM TEQ (a)	4E-04	2E-05
	Total with KM TEQ (b)	3E-04	2E-05
Angler/Sportsman (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	4E-07
	Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	4E-07
	Surface Water (excluding KM TEQs) (a)	3E-08	4E-09
	Surface Water (based on KM TEQs) (b)	3E-08	4E-09
	Crab Muscle & Hepatopancreas (excluding KM TEQs)	6E-04	4E-05
	Crab Muscle & Hepatopancreas (based on KM TEQs)	6E-04	3E-05
	Total without KM TEQ (a)	6E-04	4E-05
	Total with KM TEQ (b)	6E-04	4E-05
Angler/Sportsman (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	2E-06	4E-07
	Accessible Surface Sediment (based on KM TEQs) (b)	2E-06	4E-07
	Surface Water (excluding KM TEQs) (a)	3E-08	4E-09
	Surface Water (based on KM TEQs) (b)	3E-08	4E-09
	Crab Muscle & Hepatopancreas (excluding KM TEQs)	8E-04	5E-05
	Crab Muscle & Hepatopancreas (based on KM TEQs)	8E-04	5E-05
	Total without KM TEQ (a)	8E-04	5E-05
	Total with KM TEQ (b)	8E-04	5E-05

Notes:
CTE - Central Tendency Exposure.
KM - Kaplan Meier
RME - Reasonable Maximum Exposure.
TEQ - Toxicity Equivalence.
(a) Cumulative cancer risks where TEQ calculated manually.
(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator
(c) Cancer risks for adult and child age groups summed to yield 26 year total exposure duration for RME and a 12 year exposure duration for CTE.
(d) Consistent with USEPA guidance (1989b), potential carcinogenic risks are presented using one significant figure. Based on standard practice for rounding numbers, risk estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and risk estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-6
SUMMARY OF CUMULATIVE SITEWIDE NONCANCER HAZARD FOR THE ANGLER/SPORTSMAN RECEPTOR - CRAB CONSUMPTION SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Hazard Index (c)	
		RME	CTE
Angler/Sportsman (Child)	Crab Muscle & Hepatopancreas (excluding KM TEQs)	3E+01	5E+00
	Crab Muscle & Hepatopancreas (based on KM TEQs)	3E+01	5E+00
	Total without KM TEQ (a)	3E+01	5E+00
	Total with KM TEQ (b)	3E+01	5E+00
Angler/Sportsman (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	7E-02	2E-02
	Accessible Surface Sediment (based on KM TEQs) (b)	7E-02	2E-02
	Surface Water (excluding KM TEQs) (a)	2E-03	4E-04
	Surface Water (based on KM TEQs) (b)	2E-03	4E-04
	Crab Muscle & Hepatopancreas (excluding KM TEQs)	2E+01	3E+00
	Crab Muscle & Hepatopancreas (based on KM TEQs)	2E+01	3E+00
	Total without KM TEQ (a)	2E+01	3E+00
	Total with KM TEQ (b)	2E+01	3E+00
Angler/Sportsman (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	6E-02	2E-02
	Accessible Surface Sediment (based on KM TEQs) (b)	6E-02	2E-02
	Surface Water (excluding KM TEQs) (a)	1E-03	3E-04
	Surface Water (based on KM TEQs) (b)	1E-03	3E-04
	Crab Muscle & Hepatopancreas (excluding KM TEQs)	2E+01	3E+00
	Crab Muscle & Hepatopancreas (based on KM TEQs)	2E+01	3E+00
	Total without KM TEQ (a)	2E+01	3E+00
	Total with KM TEQ (b)	2E+01	3E+00

Notes:

CTE - Central Tendency Exposure.

KM - Kaplan Meier

RME - Reasonable Maximum Exposure.

TEQ - Toxicity Equivalence.

(a) Cumulative cancer risks where TEQ calculated manually.

(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator

(c) Consistent with USEPA guidance (1989b), potential noncarcinogenic hazard indices are presented using one significant figure. Based on standard practice for rounding numbers, hazard estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and hazard estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to

TABLE 6-7
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (RME SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1
Angler/Sportsman (Child) (f)	Total Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	3E-04		2,3,7,8-TCDD PCB-126 Total Non-DL PCBs Arsenic, inorganic Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF PCB-105 PCB-118 Benzo(a)pyrene Dibenz(a,h)anthracene 4,4'-DDD 4,4'-DDE Dieldrin	4E+01	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs 4,4'-DDD Methyl Mercury Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF PCB-105 PCB-118 PCB-169 2,4'-DDD 4,4'-DDE Dieldrin Nonachlor, trans- Pyridine Arsenic, inorganic Cobalt Mercury
	Total Mixed Fish Diet (based on KM TEQs) (b,e)	ing	3E-04				4E+01		
	Total Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	3E-04	2,3,7,8-TCDD Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ)	PCB-126 Total Non-DL PCBs Arsenic, inorganic Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF PCB-77 PCB-105 PCB-118 PCB-169 4,4'-DDE Dieldrin Heptachlor epoxide, cis-	3E+01	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF PCB-77 PCB-105 PCB-118 PCB-169 4,4'-DDD 4,4'-DDE Heptachlor epoxide, cis- Nonachlor, trans- Pyridine Arsenic, inorganic Cadmium Cobalt Copper Mercury Methyl Mercury
	Total Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	3E-04				3E+01		
Angler/Sportsman (Adolescent)	Fishing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06	No chemicals with risks >1E-6			1E-01	No chemicals with target organ HI>0.1	
	Fishing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06				1E-01		
	Fishing Surface Water (excluding KM TEQs) (a)	ing/derm	8E-08	No chemicals with risks >1E-6			3E-03	No chemicals with target organ HI>0.1	
	Fishing Surface Water (based on KM TEQs) (b)	ing/derm	8E-08				2E-03		
	Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	3E-04	PCB-126 Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	2,3,7,8-TCDD PCB-118 Total Non-DL PCBs Arsenic, inorganic	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF PCB-105 PCB-169 Benzo(a)pyrene Dibenz(a,h)anthracene 4,4'-DDD 4,4'-DDE Dieldrin Heptachlor epoxide, cis-	3E+01	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs 4,4'-DDD Methyl Mercury Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF PCB-105 PCB-118 2,4'-DDD 4,4'-DDE Nonachlor, trans- Pyridine Arsenic, inorganic Cobalt Mercury
	Mixed Fish Diet (based on KM TEQs) (b,e)	ing	3E-04				3E+01		
	Crabbing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06	No chemicals with risks >1E-6			7E-02	No chemicals with target organ HI>0.1	
	Crabbing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06				7E-02		
	Crabbing Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08	No chemicals with risks >1E-6			2E-03	No chemicals with target organ HI>0.1	
	Crabbing Surface Water (based on KM TEQs) (b)	ing/derm	5E-08				2E-03		
	Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	4E-04	2,3,7,8-TCDD Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ)	2,3,4,7,8-PeCDF PCB-126 Total Non-DL PCBs Arsenic, inorganic Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 1,2,3,4,7,8-HxCDF PCB-77 PCB-105 PCB-118 PCB-169 4,4'-DDE Dieldrin Heptachlor epoxide, cis-	2E+01	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF PCB-105 PCB-118 PCB-169 4,4'-DDD Nonachlor, trans- Pyridine Arsenic, inorganic Cadmium Copper Mercury Methyl Mercury
	Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	3E-04				2E+01		
	Total Fishing (excluding KM TEQs) (a,e)		3E-04				3E+01		
	Total Fishing (based on KM TEQs) (b,e)		3E-04				3E+01		
	Total Crabbing (excluding KM TEQs) (a)		4E-04				2E+01		
	Total Crabbing (based on KM TEQs) (b)		3E-04				2E+01		

TABLE 6-7
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (RME SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1
Angler/Sportsman (Adult)	Fishing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-06	None	None	Arsenic, inorganic	1E-01	No chemicals with target organ HI>0.1	
	Fishing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-06				1E-01		
	Fishing Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08	No chemicals with risks >1E-6			2E-03	No chemicals with target organ HI>0.1	
	Fishing Surface Water (based on KM TEQs) (b)	ing/derm	5E-08				2E-03		
	Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	5E-04	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	2,3,4,7,8-PeCDF PCB-118 Dieldrin Arsenic, inorganic	1,2,3,7,8-PeCDD 1,2,3,6,7,8-HxCDD 2,3,7,8-TCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF PCB-105 PCB-156/157 PCB-169 Benzo(a)pyrene Dibenz(a,h)anthracene 4,4'-DDD 4,4'-DDE Heptachlor epoxide, cis-	3E+01	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs 4,4'-DDD Methyl Mercury Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF PCB-105 PCB-118 2,4'-DDD 4,4'-DDE Nonachlor, trans- Pyridine Arsenic, inorganic Cobalt Mercury
	Mixed Fish Diet (based on KM TEQs) (b,e)	ing	5E-04				3E+01		
	Crabbing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06	No chemicals with risks >1E-6			6E-02	No chemicals with target organ HI>0.1	
	Crabbing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06				6E-02		
	Crabbing Surface Water (excluding KM TEQs) (a)	ing/derm	3E-08	No chemicals with risks >1E-6			1E-03	No chemicals with target organ HI>0.1	
	Crabbing Surface Water (based on KM TEQs) (b)	ing/derm	3E-08				1E-03		
	Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	6E-04	2,3,7,8-TCDD PCB-126 Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	2,3,7,8-TCDF 2,3,4,7,8-PeCDF PCB-118 Total Non-DL PCBs Arsenic, inorganic	1,2,3,7,8-PeCDD 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF PCB-77 PCB-105 PCB-156/157 PCB-169 4,4'-DDE Dieldrin Heptachlor epoxide, cis-	2E+01	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF 1,2,3,4,7,8-HxCDF PCB-105 PCB-118 PCB-169 4,4'-DDD Nonachlor, trans- Pyridine Arsenic, inorganic Cadmium Copper Mercury Methyl Mercury
	Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	6E-04				2E+01		
	Total Fishing (excluding KM TEQs) (a,e)		5E-04				3E+01		
	Total Fishing (based on KM TEQs) (b,e)		6E-04				3E+01		
	Total Crabbing (excluding KM TEQs) (a)		6E-04				2E+01		
	Total Crabbing (based on KM TEQs) (b)		6E-04				2E+01		
Angler/Sportsman (Combined Adult/Child) (c)	Fishing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-06	None	None	Arsenic, inorganic	Combined Adult/Child not applicable for noncancer.		
	Fishing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-06						
	Fishing Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08	No chemicals with risks >1E-6					
	Fishing Surface Water (based on KM TEQs) (b)	ing/derm	5E-08						
	Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	8E-04	2,3,7,8-TCDD PCB-126 Total Non-DL PCBs Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,4,7,8-PeCDF PCB-118 Dieldrin Arsenic, inorganic	1,2,3,6,7,8-HxCDD 2,3,7,8-TCDF 1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF PCB-77 PCB-105 PCB-156/157 PCB-167 PCB-169 Benzo(a)pyrene Dibenz(a,h)anthracene 4,4'-DDD 4,4'-DDE Chlordane, alpha (cis) Heptachlor epoxide, cis-			
	Mixed Fish Diet (based on KM TEQs) (b,e)	ing	8E-04						
	Crabbing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06	No chemicals with risks >1E-6					
	Crabbing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06						
	Crabbing Surface Water (excluding KM TEQs) (a)	ing/derm	3E-08	No chemicals with risks >1E-6					
	Crabbing Surface Water (based on KM TEQs) (b)	ing/derm	3E-08						
	Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	8E-04	2,3,7,8-TCDD PCB-126 Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)	1,2,3,7,8-PeCDD 2,3,7,8-TCDF 2,3,4,7,8-PeCDF PCB-118 Total Non-DL PCBs Dieldrin Arsenic, inorganic	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 1,2,3,6,7,8-HxCDF PCB-77 PCB-105 PCB-156/157 PCB-169 4,4'-DDE Heptachlor epoxide, cis- Heptachlor epoxide, trans-			
	Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	8E-04						
	Total Fishing (excluding KM TEQs) (a,e)		8E-04						
	Total Fishing (based on KM TEQs) (b,e)		8E-04						
	Total Crabbing (excluding KM TEQs) (a)		8E-04						
	Total Crabbing (based on KM TEQs) (b)		8E-04						

TABLE 6-7
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (RME SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1
Swimmer (Child)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	1E-06		Cumulative risk <1E-4.		1E-01	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	1E-06				1E-01		
	Surface Water (excluding KM TEQs) (a)	ing/derm	2E-07				9E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	2E-07				9E-03		
	Total (excluding KM TEQs) (a)		2E-06				2E-01		
	Total (based on KM TEQs) (b)]		2E-06				1E-01		
Swimmer (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06		Cumulative risk <1E-4.		9E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06				9E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	5E-07				1E-02		
	Surface Water (based on KM TEQs) (b)	ing/derm	5E-07				1E-02		
	Total (excluding KM TEQs) (a)		3E-06				1E-01		
	Total (based on KM TEQs) (b)]		2E-06				1E-01		
Swimmer (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	1E-06		Cumulative risk <1E-4.		3E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	1E-06				3E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	1E-07				3E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	1E-07				3E-03		
	Total (excluding KM TEQs) (a)		1E-06				3E-02		
	Total (based on KM TEQs) (b)]		1E-06				3E-02		
Swimmer (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-06		Cumulative risk <1E-4.		Combined Adult/Child not applicable for noncancer.		
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06						
	Surface Water (excluding KM TEQs) (a)	ing/derm	3E-07						
	Surface Water (based on KM TEQs) (b)	ing/derm	3E-07						
	Total (excluding KM TEQs) (a)		3E-06						
	Total (based on KM TEQs) (b)]		3E-06						
Wader (Child)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	1E-06		Cumulative risk <1E-4.		1E-01	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	1E-06				1E-01		
	Surface Water (excluding KM TEQs) (a)	ing/derm	3E-08				1E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	3E-08				1E-03		
	Total (excluding KM TEQs) (a)		2E-06				1E-01		
	Total (based on KM TEQs) (b)]		1E-06				1E-01		
Wader (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06		Cumulative risk <1E-4.		9E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06				9E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	7E-08				2E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	7E-08				2E-03		
	Total (excluding KM TEQs) (a)		2E-06				9E-02		
	Total (based on KM TEQs) (b)]		2E-06				9E-02		
Wader (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	1E-06		Cumulative risk <1E-4.		3E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	1E-06				3E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	1E-08				5E-04		
	Surface Water (based on KM TEQs) (b)	ing/derm	1E-08				5E-04		
	Total (excluding KM TEQs) (a)		1E-06				3E-02		
	Total (based on KM TEQs) (b)]		1E-06				3E-02		
Wader (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-06		Cumulative risk <1E-4.		Combined Adult/Child not applicable for noncancer.		
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06						
	Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08						
	Surface Water (based on KM TEQs) (b)	ing/derm	5E-08						
	Total (excluding KM TEQs) (a)		3E-06						
	Total (based on KM TEQs) (b)]		3E-06						
Boater (Child)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	Children (<7 years old) are not expected to participate in boating activities on the bay.						
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm							
	Surface Water (excluding KM TEQs) (a)	ing/derm							
	Surface Water (based on KM TEQs) (b)	ing/derm							
	Total (excluding KM TEQs) (a)								
	Total (based on KM TEQs) (b)]								
Boater (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-06		Cumulative risk <1E-4.		9E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-06				9E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	3E-07				1E-02		
	Surface Water (based on KM TEQs) (b)	ing/derm	3E-07				1E-02		
	Total (excluding KM TEQs) (a)		2E-06				1E-01		
	Total (based on KM TEQs) (b)]		2E-06				1E-01		
Boater (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07		Cumulative risk <1E-4.		1E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-07				1E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	3E-07				9E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	3E-07				9E-03		
	Total (excluding KM TEQs) (a)		7E-07				2E-02		
	Total (based on KM TEQs) (b)]		7E-07				2E-02		
Boater (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07		Cumulative risk <1E-4.		Combined Adult/Child not applicable for noncancer.		
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-07						
	Surface Water (excluding KM TEQs) (a)	ing/derm	3E-07						
	Surface Water (based on KM TEQs) (b)	ing/derm	3E-07						
	Total (excluding KM TEQs) (a)		7E-07						
	Total (based on KM TEQs) (b)]		7E-07						
Worker	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-06		Cumulative risk <1E-4.		8E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-06				8E-02		

Notes:
derm - dermal contact
DL =- Dioxin like
ing - ingestion
HI - Hazard Index
KM - Kaplan Meier
PCB - Polychlorinated biphenyl

TABLE 6-7
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (RME SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1

PCDD/F - Polychlorinated dibenzo(p)dioxins/furans
Potential COC - Potential chemical of concern
RME = Reasonable Maximum Exposure
TEQ = Toxicity equivalence
(a) Cumulative cancer risks where TEQ calculated manually.
(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator.
(c) Cancer risks for adult and child age groups summed to yeild 26 year total exposure duration.
(d) The totla HI is presented here without regard to target organ analysis. As noted in (g), potential COCs are identified for noncancer only where the target organ HI is greater than one.
(e) Total mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder and white perch.
(f) Children (1 to <7 years) are assumed to not typically accompany adult anglers due to safety concerns. Therefore, exposure to a child angler to sediment and surface water is not evaluated.
(g) Potential COCs were identified according to one of the following rules:
1. Where the total cumulative risk for a receptor exceeds 1E-04, any chemical with an individual pathway risk greater than 1E-06, or
2. Where the total cumulative target organ HI for a receptor exceeds 1, any chemical with in individual pathway target organ HI greater than 0.1.
(h) Consistent with USEPA guidance (1989b), potential carcinogenic risks and noncarcinogenic hazard indices are presented using one significant figure. Based on standard practice for rounding numbers, risk or hazard estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and risk or hazard estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-8
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (CTE SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1
Angler/Sportsman (Child) (f)	Total Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	9E-06	Cumulative risk <1E-4.			3E+00	Total Non-DL PCBs	2,3,7,8-TCDD PCB-126 4,4'-DDD Methyl Mercury Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)
	Total Mixed Fish Diet (based on KM TEQs) (b,e)	ing	9E-06				4E+00		
	Total Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	2E-05				5E+00	2,3,7,8-TCDD Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ)	2,3,4,7,8-PeCDF PCB-118 PCB-126 Total Non-DL PCBs Methyl Mercury Total DL-PCBs (based on KM TEQ)
	Total Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	2E-05				5E+00		
Angler/Sportsman (Adolescent)	Fishing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07	Cumulative risk <1E-4.			4E-02	No chemicals with target organ HI>0.1	
	Fishing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-07				4E-02		
	Fishing Surface Water (excluding KM TEQs) (a)	ing/derm	9E-09				7E-04	No chemicals with target organ HI>0.1	
	Fishing Surface Water (based on KM TEQs) (b)	ing/derm	9E-09				7E-04		
	Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	1E-05				2E+00		2,3,7,8-TCDD PCB-126 Total Non-DL PCBs 4,4'-DDD Methyl Mercury Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)
	Mixed Fish Diet (based on KM TEQs) (b,e)	ing	1E-05				2E+00		
	Crabbing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-07				2E-02	No chemicals with target organ HI>0.1	
	Crabbing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07				2E-02		
	Crabbing Surface Water (excluding KM TEQs) (a)	ing/derm	6E-09				4E-04	No chemicals with target organ HI>0.1	
	Crabbing Surface Water (based on KM TEQs) (b)	ing/derm	6E-09				4E-04		
	Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	2E-05				3E+00	2,3,7,8-TCDD Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ)	PCB-126 Total Non-DL PCBs Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)
	Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	2E-05				3E+00		
	Total Fishing (excluding KM TEQs) (a,e)		1E-05				2E+00		
	Total Fishing (based on KM TEQs) (b,e)		1E-05				2E+00		
	Total Crabbing (excluding KM TEQs) (a)		2E-05				3E+00		
	Total Crabbing (based on KM TEQs) (b)		2E-05				3E+00		
Angler/Sportsman (Adult)	Fishing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	7E-07	Cumulative risk <1E-4.			4E-02	No chemicals with target organ HI>0.1	
	Fishing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	6E-07				4E-02		
	Fishing Surface Water (excluding KM TEQs) (a)	ing/derm	6E-09				5E-04	No chemicals with target organ HI>0.1	
	Fishing Surface Water (based on KM TEQs) (b)	ing/derm	6E-09				5E-04		
	Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	2E-05				2E+00		2,3,7,8-TCDD PCB-126 Total Non-DL PCBs 4,4'-DDD Methyl Mercury Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ) Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)
	Mixed Fish Diet (based on KM TEQs) (b,e)	ing	2E-05				2E+00		
	Crabbing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07				2E-02	No chemicals with target organ HI>0.1	
	Crabbing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-07				2E-02		
	Crabbing Surface Water (excluding KM TEQs) (a)	ing/derm	4E-09				3E-04	No chemicals with target organ HI>0.1	
	Crabbing Surface Water (based on KM TEQs) (b)	ing/derm	4E-09				3E-04		
	Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	4E-05				3E+00	2,3,7,8-TCDD Total PCDD/Fs (excluding KM TEQ) Total PCDD/Fs (based on KM TEQ)	PCB-126 Total Non-DL PCBs Total DL-PCBs (excluding KM TEQ) Total DL-PCBs (based on KM TEQ)
	Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	3E-05				3E+00		
	Total Fishing (excluding KM TEQs) (a,e)		2E-05				2E+00		
	Total Fishing (based on KM TEQs) (b,e)		2E-05				2E+00		
	Total Crabbing (excluding KM TEQs) (a)		4E-05				3E+00		
	Total Crabbing (based on KM TEQs) (b)		4E-05				3E+00		
Angler/Sportsman (Combined Adult/Child) (c)	Fishing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	7E-07	Cumulative risk <1E-4.			Combined Adult/Child not applicable for noncancer.		
	Fishing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	6E-07						
	Fishing Surface Water (excluding KM TEQs) (a)	ing/derm	6E-09						
	Fishing Surface Water (based on KM TEQs) (b)	ing/derm	6E-09						
	Mixed Fish Diet (excluding KM TEQs) (a,e)	ing	3E-05						
	Mixed Fish Diet (based on KM TEQs) (b,e)	ing	3E-05						
	Crabbing Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07						
	Crabbing Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	4E-07						
	Crabbing Surface Water (excluding KM TEQs) (a)	ing/derm	4E-09						
	Crabbing Surface Water (based on KM TEQs) (b)	ing/derm	4E-09						
	Crab Muscle & Hepatopancreas (excluding KM TEQs) (a)	ing	5E-05						
	Crab Muscle & Hepatopancreas (based on KM TEQs) (b)	ing	5E-05						
	Total Fishing (excluding KM TEQs) (a,e)		3E-05						
	Total Fishing (based on KM TEQs) (b,e)		3E-05						
	Total Crabbing (excluding KM TEQs) (a)		5E-05						
	Total Crabbing (based on KM TEQs) (b)		5E-05						

TABLE 6-8
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (CTE SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1
Swimmer (Child)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-07		Cumulative risk <1E-4.		4E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-07				4E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	4E-08				5E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	4E-08				5E-03		
	Total (excluding KM TEQs) (a)		2E-07				4E-02		
	Total (based on KM TEQs) (b))		2E-07				4E-02		
Swimmer (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-07		Cumulative risk <1E-4.		3E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07				3E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	1E-07				7E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	1E-07				7E-03		
	Total (excluding KM TEQs) (a)		5E-07				4E-02		
	Total (based on KM TEQs) (b))		4E-07				4E-02		
Swimmer (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-07		Cumulative risk <1E-4.		1E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-07				1E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	2E-08				2E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	2E-08				2E-03		
	Total (excluding KM TEQs) (a)		2E-07				1E-02		
	Total (based on KM TEQs) (b))		2E-07				1E-02		
Swimmer (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07		Cumulative risk <1E-4.			Combined Adult/Child not applicable for noncancer.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07						
	Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08						
	Surface Water (based on KM TEQs) (b)	ing/derm	5E-08						
	Total (excluding KM TEQs) (a)		4E-07						
	Total (based on KM TEQs) (b))		4E-07						
Wader (Child)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-07		Cumulative risk <1E-4.		4E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-07				4E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	1E-08				4E-04		
	Surface Water (based on KM TEQs) (b)	ing/derm	1E-08				4E-04		
	Total (excluding KM TEQs) (a)		2E-07				4E-02		
	Total (based on KM TEQs) (b))		2E-07				4E-02		
Wader (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-07		Cumulative risk <1E-4.		3E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07				3E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	8E-09				5E-04		
	Surface Water (based on KM TEQs) (b)	ing/derm	7E-09				5E-04		
	Total (excluding KM TEQs) (a)		4E-07				3E-02		
	Total (based on KM TEQs) (b))		4E-07				3E-02		
Wader (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	2E-07		Cumulative risk <1E-4.		1E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	2E-07				1E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	2E-09				1E-04		
	Surface Water (based on KM TEQs) (b)	ing/derm	2E-09				1E-04		
	Total (excluding KM TEQs) (a)		2E-07				1E-02		
	Total (based on KM TEQs) (b))		2E-07				1E-02		
Wader (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	4E-07		Cumulative risk <1E-4.			Combined Adult/Child not applicable for noncancer.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07						
	Surface Water (excluding KM TEQs) (a)	ing/derm	7E-09						
	Surface Water (based on KM TEQs) (b)	ing/derm	7E-09						
	Total (excluding KM TEQs) (a)		4E-07						
	Total (based on KM TEQs) (b))		4E-07						
Boater (Child)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	Young children (<7 years old) are not expected to participate in boating activities on the bay.						
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm							
	Surface Water (excluding KM TEQs) (a)	ing/derm							
	Surface Water (based on KM TEQs) (b)	ing/derm							
	Total (excluding KM TEQs) (a)								
	Total (based on KM TEQs) (b))								
Boater (Adolescent)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-07		Cumulative risk <1E-4.		3E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07				3E-02		
	Surface Water (excluding KM TEQs) (a)	ing/derm	8E-08				5E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	8E-08				5E-03		
	Total (excluding KM TEQs) (a)		4E-07				3E-02		
	Total (based on KM TEQs) (b))		4E-07				3E-02		
Boater (Adult)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	6E-08		Cumulative risk <1E-4.		4E-03	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	6E-08				4E-03		
	Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08				3E-03		
	Surface Water (based on KM TEQs) (b)	ing/derm	5E-08				3E-03		
	Total (excluding KM TEQs) (a)		1E-07				7E-03		
	Total (based on KM TEQs) (b))		1E-07				7E-03		
Boater (Combined Adult/Child) (c)	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	6E-08		Cumulative risk <1E-4.			Combined Adult/Child not applicable for noncancer.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	6E-08						
	Surface Water (excluding KM TEQs) (a)	ing/derm	5E-08						
	Surface Water (based on KM TEQs) (b)	ing/derm	5E-08						
	Total (excluding KM TEQs) (a)		1E-07						
	Total (based on KM TEQs) (b))		1E-07						
Worker	Accessible Surface Sediment (excluding KM TEQs) (a)	ing/derm	3E-07		Cumulative risk <1E-4.		3E-02	Total HI <1.	
	Accessible Surface Sediment (based on KM TEQs) (b)	ing/derm	3E-07				3E-02		

Notes:
CTE - Central Tendency Exposure
derm - dermal contact
DL =- Dioxin like
ing - ingestion

TABLE 6-8
SUMMARY OF CUMULATIVE SITEWIDE RISKS AND IDENTIFICATION OF POTENTIAL CHEMICALS OF CONCERN (CTE SCENARIO)
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Receptor	Medium	Exposure Route	Identification of Potential Chemicals of Concern (g)						
			RME Cancer Risk (h)	Chemicals with Cancer Risk >10-4	Chemicals with Cancer Risk >10-5 and ≤10-4	Chemicals with Cancer Risk >10-6 and ≤10-5	RME Total HI (d,h)	Chemicals with Target Organ HI>1	Chemicals with Target Organ HI>0.1 and <1

HI - Hazard Index
KM - Kaplan Meier
PCB - Polychlorinated biphenyl
PCDD/F - Polychlorinated dibenzo(p)dioxins/furans
Potential COC - Potential chemical of concern
TEQ = Toxicity equivalence
(a) Cumulative cancer risks where TEQ calculated manually.
(b) Cumulative cancer risks where TEQ calculated using the KM TEQ calculator.
(c) Cancer risks for adult and young child age groups summed to yeild 26 year total exposure duration.
(d) The totla HI is presented here without regard to target organ analysis. As noted in (g), potential COCs are identified for noncancer only where the target organ HI is greater than one.
(e) Total mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder and white perch.
(f) Young children (1 to <7 years) are assumed to not typically accompany adult anglers due to safety concerns. Therefore, exposure to a young child angler to sediment and surface water is not evaluated.
(g) Potential COCs were identified according to one of the following rules:
1. Where the total cumulative risk for a receptor exceeds 1E-04, any chemical with an individual pathway risk greater than 1E-06, or
2. Where the total cumulative target organ HI for a receptor exceeds 1, any chemical with in individual pathway target organ HI greater than 0.1.
(h) Consistent with USEPA guidance (1989b), potential carcinogenic risks and noncarcinogenic hazard indices are presented using one significant figure. Based on standard practice for rounding numbers, risk or hazard estimates where the first digit after the decimal place is equal to or greater than 5 were rounded up (e.g., 1.5E-04 rounds to 2E-04), and risk or hazard estimates where the first digit after the decimal place is less than 5 were rounded down (e.g., 1.4E-04 rounds to 1E-04).

TABLE 6-9
SUMMARY OF POTENTIAL CHEMICALS OF CONCERN BY MEDIUM AND SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Potential COC (a)	Accessible Surface Sediment		Surface Water		Mixed Fish Diet (b)		Crab Muscle and Hepatopancreas	
	RME	CTE	RME	CTE	RME	CTE	RME	CTE
Dioxin-like Compounds								
2,3,7,8-TCDD					X	X	X	X
1,2,3,7,8-PeCDD					X		X	
1,2,3,6,7,8-HxCDD					X			
2,3,7,8-TCDF					X		X	
1,2,3,7,8-PeCDF					X		X	
2,3,4,7,8-PeCDF					X		X	X
1,2,3,4,7,8-HxCDF					X		X	
1,2,3,6,7,8-HxCDF					X		X	
Total PCDD/Fs (excluding KM TEQ)					X	X	X	X
Total PCDD/Fs (based on KM TEQ)					X	X	X	X
PCB-77					X		X	
PCB-105					X		X	
PCB-118					X		X	X
PCB-126					X	X	X	X
PCB-156/157					X		X	
PCB-167					X			
PCB-169					X		X	
Total DL-PCBs (excluding KM TEQ)					X	X	X	X
Total DL-PCBs (based on KM TEQ)					X	X	X	X
Non-DL PCBs								
Total Non-DL PCBs					X	X	X	X
PAHs								
Benzo(a)pyrene					X			
Dibenz(a,h)anthracene					X			
Pesticides & Organics								
2,4'-DDD					X			
4,4'-DDD					X	X	X	
4,4'-DDE					X		X	
Chlordane, alpha (cis)					X			
Dieldrin					X		X	
Heptachlor epoxide, cis-					X		X	
Heptachlor epoxide, trans-							X	
Nonachlor, trans-					X		X	
Pyridine					X		X	

TABLE 6-9
SUMMARY OF POTENTIAL CHEMICALS OF CONCERN BY MEDIUM AND SCENARIO
BASELINE HUMAN HEALTH RISK ASSESSMENT
NEWARK BAY STUDY AREA

Potential COC (a)	Accessible Surface Sediment		Surface Water		Mixed Fish Diet (b)		Crab Muscle and Hepatopancreas	
	RME	CTE	RME	CTE	RME	CTE	RME	CTE
Inorganics								
Arsenic, inorganic	X				X		X	
Cadmium							X	
Cobalt					X		X	
Copper							X	
Mercury					X		X	
Methyl Mercury					X	X	X	X

Notes:

CTE - Central Tendency Exposure
DL - Dioxin like congener
KM - Kaplan Meier
PAH - Polycyclic Aromatic Hydrocarbon
PCB - Polychlorinated Biphenyl
PCDD/F - Polychlorinated dibenzo(p)dioxins/furans
Potential COC - Potential Chemical of Concern
RME - Reasonable Maximum Exposure
TEQ - Toxicity equvalence

(a) Chemicals identified as potential COCs for a medium and scenario are noted with an X.
(b) Mixed fish diet assumed to consist of equal fractions (20%) of American eel, bluefish, striped bass, summer flounder, and white perch.

Figures

City: Citrix Div/Group: IM/DV Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Newark Bay (B0009989.0061.00001)
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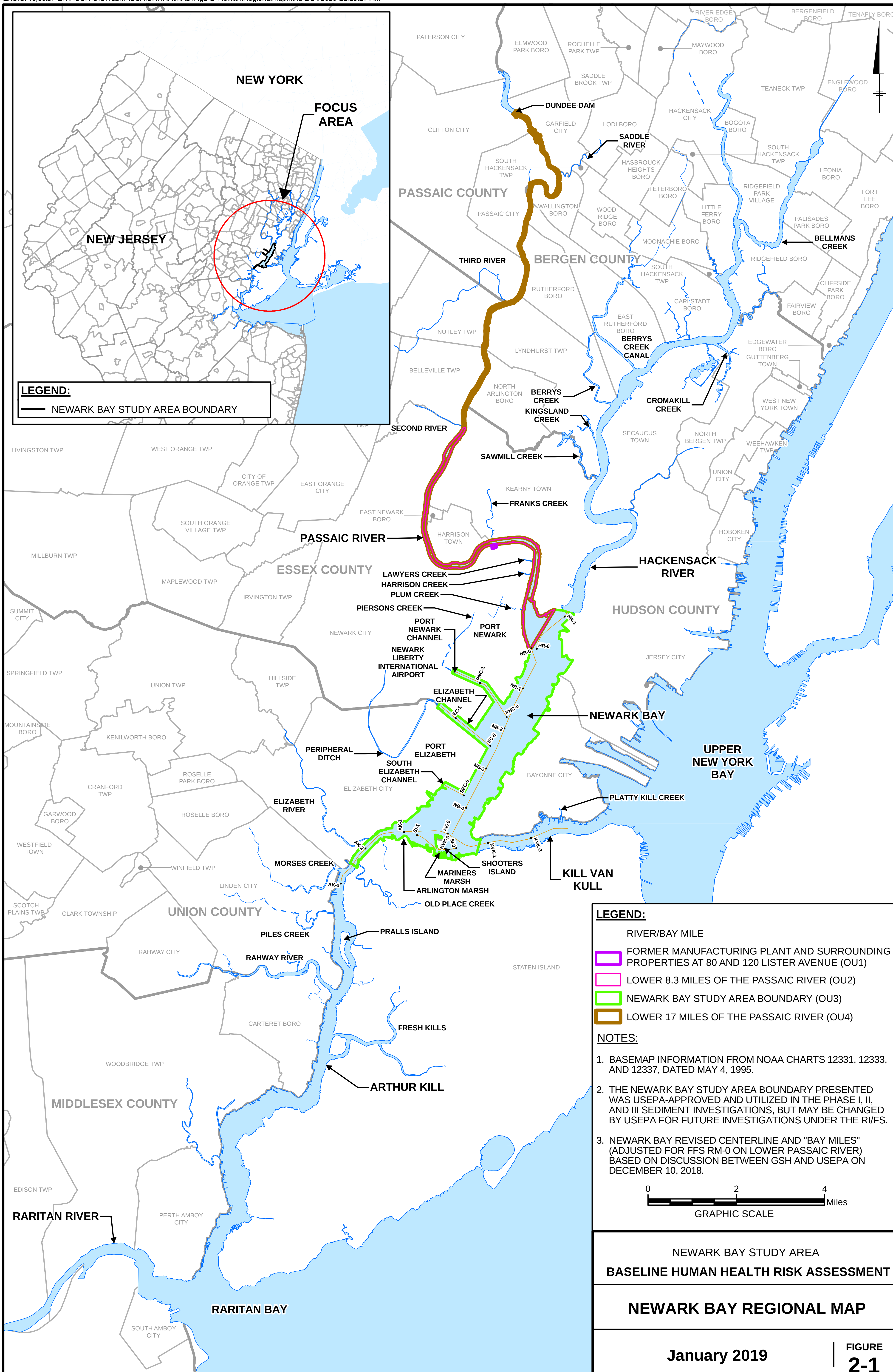


LEGEND:

RIVER/BAY MILE

FORMER MANUFACTURING PLANT AND SURROUNDING PROPERTIES AT 80 AND 120 LISTER AVENUE (OU1)

LOWER 8.3 MILES OF THE PASSAIC RIVER (OU2)

NEWARK BAY STUDY AREA BOUNDARY (OU3)

LOWER 17 MILES OF THE PASSAIC RIVER (OU4)

NOTES:

1. BASEMAP INFORMATION FROM NOAA CHARTS 12331, 12333, AND 12337, DATED MAY 4, 1995.
2. THE NEWARK BAY STUDY AREA BOUNDARY PRESENTED WAS USEPA-APPROVED AND UTILIZED IN THE PHASE I, II, AND III SEDIMENT INVESTIGATIONS, BUT MAY BE CHANGED BY USEPA FOR FUTURE INVESTIGATIONS UNDER THE RI/FS.
3. NEWARK BAY REVISED CENTERLINE AND "BAY MILES" (ADJUSTED FOR FFS RM-0 ON LOWER PASSAIC RIVER) BASED ON DISCUSSION BETWEEN GSH AND USEPA ON DECEMBER 10, 2018.

0 2 4 Miles

GRAPHIC SCALE

NEWARK BAY STUDY AREA

BASELINE HUMAN HEALTH RISK ASSESSMENT

NEWARK BAY REGIONAL MAP

January 2019

FIGURE 2-1

DRAFT

City: Citrix Div/Group: IM/DV Created By: K. SINSABAUGH Last Saved By: kgpeters
Newark Bay (B0009989.0061.00001)
Z:\GISProjects_ENV\GSH\GIS\Task\NBSA\BHHRA\MXD\Fig2-2_NBRegionalFeatures_BHHRA.mxd 12/28/2018 4:02:46 AM

LEGEND:

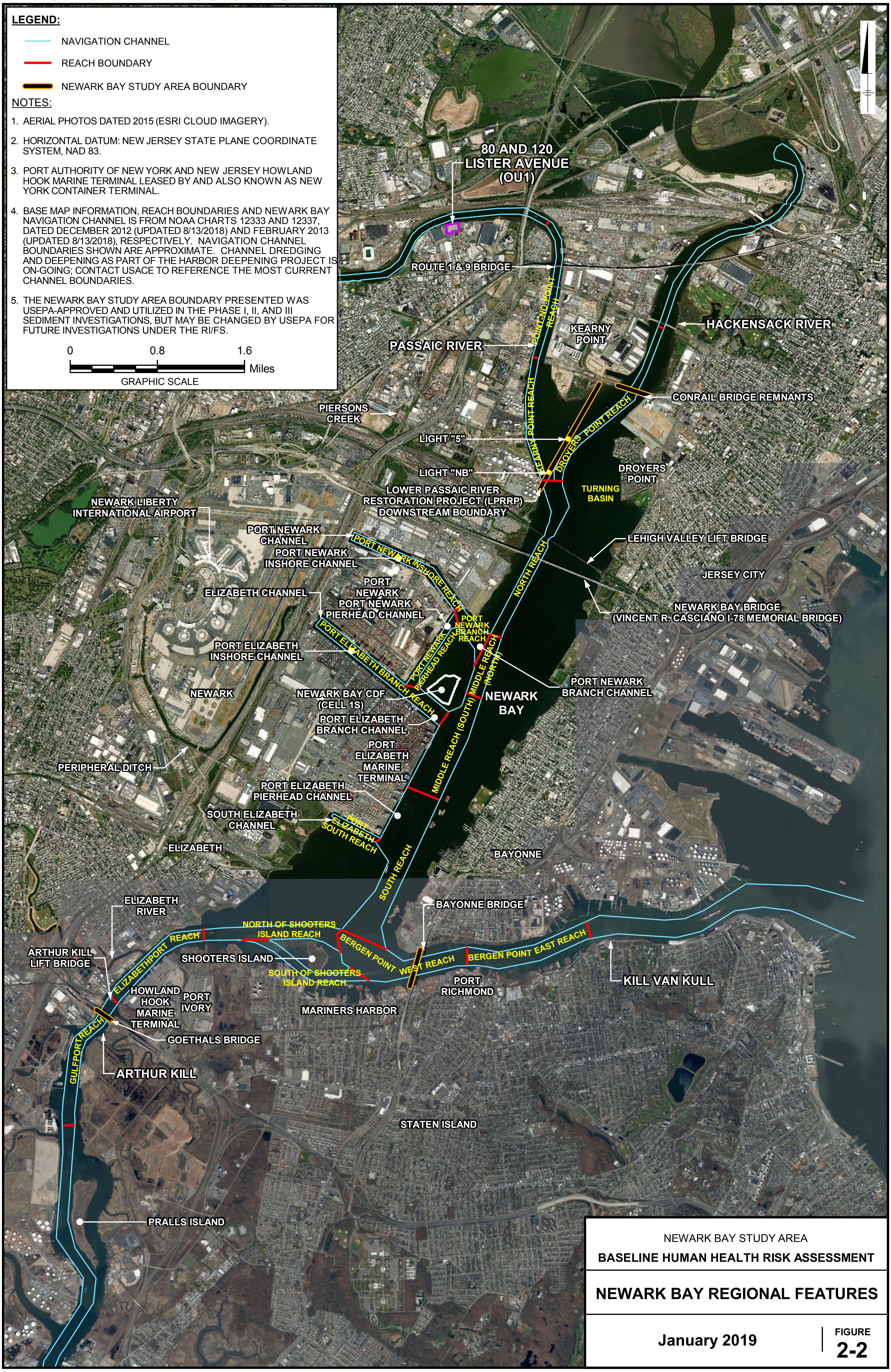
- NAVIGATION CHANNEL
- REACH BOUNDARY
- NEWARK BAY STUDY AREA BOUNDARY

NOTES:

1. AERIAL PHOTOS DATED 2015 (ESRI CLOUD IMAGERY).
2. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD 83.
3. PORT AUTHORITY OF NEW YORK AND NEW JERSEY HOWLAND HOOK MARINE TERMINAL LEASED BY AND ALSO KNOWN AS NEW YORK CONTAINER TERMINAL.
4. BASE MAP INFORMATION, REACH BOUNDARIES AND NEWARK BAY NAVIGATION CHANNEL IS FROM NOAA CHARTS 12333 AND 12337, DATED DECEMBER 2012 (UPDATED 8/13/2018) AND FEBRUARY 2013 (UPDATED 8/13/2018), RESPECTIVELY. NAVIGATION CHANNEL BOUNDARIES SHOWN ARE APPROXIMATE. CHANNEL DREDGING AND DEEPENING AS PART OF THE HARBOR DEEPENING PROJECT IS ON-GOING; CONTACT USACE TO REFERENCE THE MOST CURRENT CHANNEL BOUNDARIES.
5. THE NEWARK BAY STUDY AREA BOUNDARY PRESENTED WAS USEPA-APPROVED AND UTILIZED IN THE PHASE I, II, AND III SEDIMENT INVESTIGATIONS, BUT MAY BE CHANGED BY USEPA FOR FUTURE INVESTIGATIONS UNDER THE RI/FS.

0 0.8 1.6 Miles

GRAPHIC SCALE



NEWARK BAY STUDY AREA

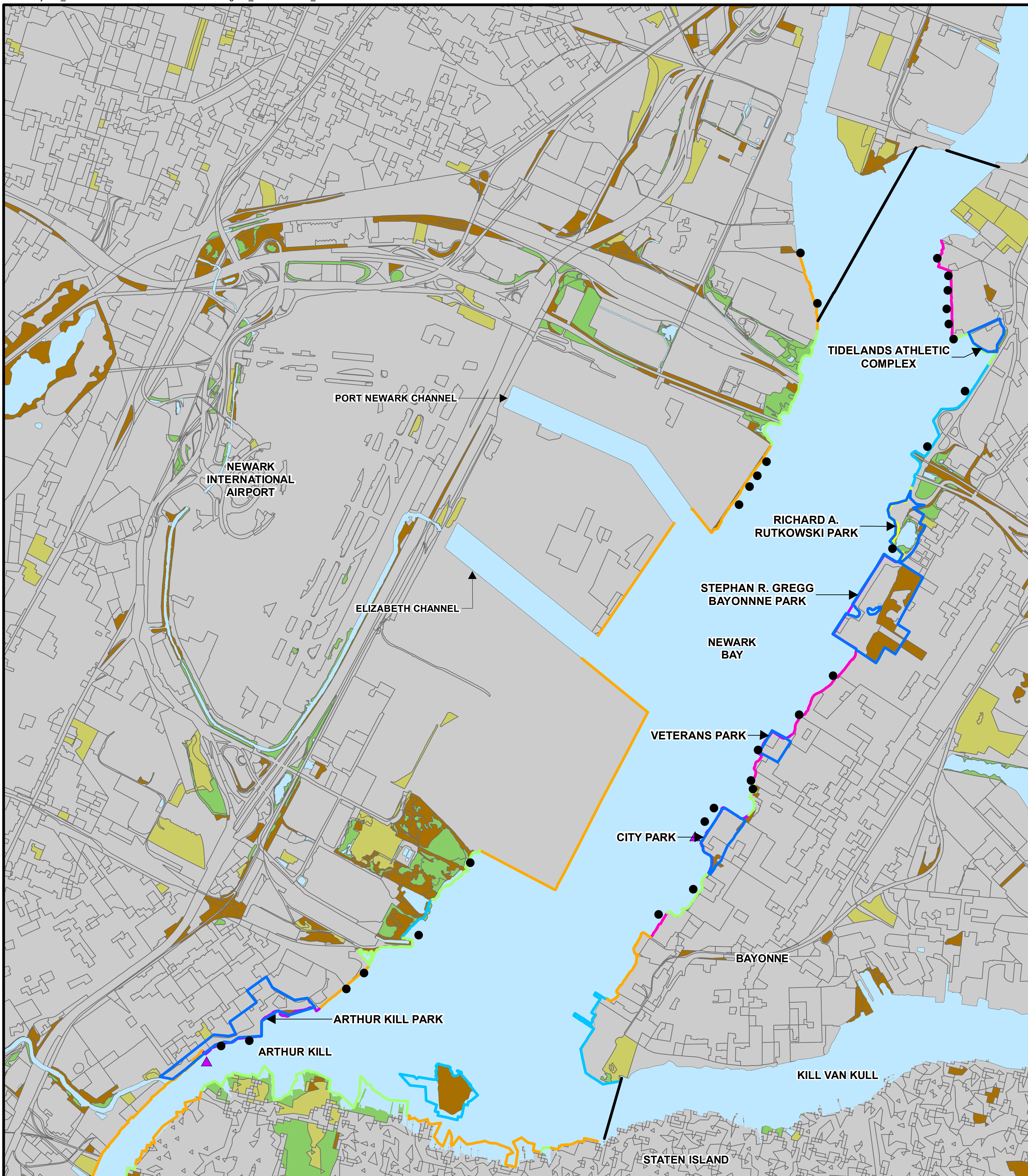
BASELINE HUMAN HEALTH RISK ASSESSMENT

NEWARK BAY REGIONAL FEATURES

January 2019

FIGURE 2-2

DRAFT



LEGEND:

- BOAT RAMP
- DISCHARGE PIPE OBSERVATION
- BARREN LAND
- FOREST
- URBAN
- WATER
- WETLANDS
- PARKS AND RECREATIONAL AREAS
- NEWARK BAY STUDY AREA BOUNDARY

OBSERVED SHORELINE USE:

- DISTURBED UPLANDS
- HABITAT
- HABITAT/RECREATIONAL
- INDUSTRIAL/COMMERCIAL
- RECREATIONAL
- RESIDENTIAL

NOTES:

1. 2012 NEW JERSEY LAND USE DATA (UPDATED IN 2015) DOWNLOADED FROM THE NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION GEOGRAPHIC INFORMATION SYSTEM WEBSITE AT www.state.nj.us/dep/gis.
2. 2011 NEW YORK NATIONAL LAND COVER DATA DOWNLOADED FROM THE NEW YORK STATE GEOGRAPHIC INFORMATION SYSTEMS CLEARINGHOUSE AT www.nysgis.state.ny.us.
3. THE NEWARK BAY STUDY AREA BOUNDARY PRESENTED WAS USEPA-APPROVED AND UTILIZED IN THE PHASE I, II, AND III SEDIMENT INVESTIGATIONS, BUT MAY BE CHANGED BY USEPA FOR FUTURE INVESTIGATIONS UNDER THE RI/FS.
4. OBSERVATIONS MADE IN 2013 REGARDING DISCHARGE PIPES, INTERTIDAL AREAS, BOAT RAMPS, AND SHORELINE HABITAT (TIERRA 2015).
5. THE INTERTIDAL AREAS SHOWN ARE CONSISTENT WITH THOSE PRESENTED IN THE PROBLEM FORMULATION (TIERRA 2013) AND VERIFIED DURING THE RECONNAISSANCE SURVEY (TIERRA 2015).
6. SHORELINE USE INFORMATION IS FROM THE NEWARK BAY STUDY AREA RECONNAISSANCE SURVEY REPORT, BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT (TIERRA 2015)."
7. REFERENCES:
   A. TIERRA. 2015. NEWARK BAY STUDY AREA RECONNAISSANCE SURVEY REPORT. BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT. APRIL.
   B. TIERRA. 2013. FINAL NEWARK BAY STUDY AREA PROBLEM FORMULATION. BASELINE HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT. JUNE.

0 3,000 6,000 Feet

GRAPHIC SCALE

NEWARK BAY STUDY AREA

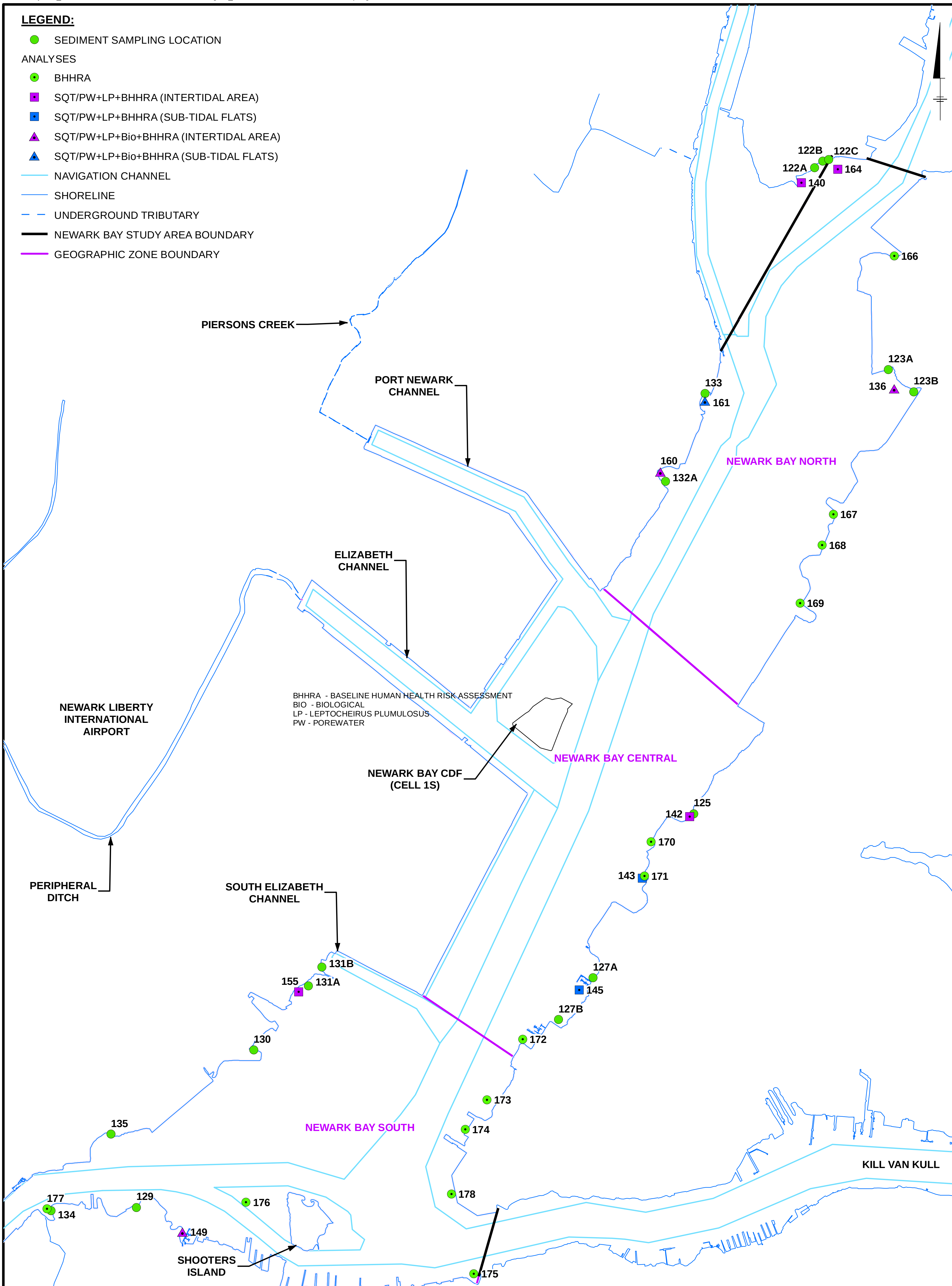
BASELINE HUMAN HEALTH RISK ASSESSMENT

SHORELINE LAND/HUMAN USE CHARACTERIZATION

January 2019

FIGURE 2-3

City: Citrix Div/Group: IM/DV Created By: K. SINSABAUGH Last Saved By: ksinsabaugh
Newark Bay (B0009989.0061.00001)
Z:\GISProjects_ENV\GSH\GIS\Task\NBSA\BHHRA\MXD\Fig3-1_Accessible Surface Sediment Sampling Locations.mxd 1/24/2019 11:12:22 AM



NOTES:

1. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD83.
2. SHORELINE IS DIGITIZED FROM AERIAL PHOTO DATED JULY 2002 (INTRASEARCH, ENGLEWOOD, CO).
3. SQT REPRESENTS THREE ANALYSES: SEDIMENT CHEMISTRY, BENTHIC INVERTEBRATE COMMUNITY, AND TOXICITY TESTING WITH L. PLUMULOSUS (10-DAY AND 28-DAY).

ACRONYMS:

BHHRA - BASELINE HUMAN HEALTH RISK ASSESSMENT
BIO - BIOLOGICAL
LP - LEPTOCHEIRUS PLUMULOSUS
PW - POREWATER
SQT = SEDIMENT QUALITY TRIAD

0 2,500 5,000 Feet
GRAPHIC SCALE

NEWARK BAY STUDY AREA
BASELINE HUMAN HEALTH RISK ASSESSMENT

ACCESSIBLE SURFACE SEDIMENT SAMPLING LOCATIONS

January 2019

FIGURE 3-1

City: SYR Div/Group: IM Created By: K. SINSABAUGH Last Saved By: kgpeters
Tierra (B0009989.0025.00001)
Z:\GISProjects_ENV\GSH\GIS\Task\NBSA\BHHRA\MXD\Fig3-2_SW_SampleLocs.mxd 12/28/2018 5:43:32 AM

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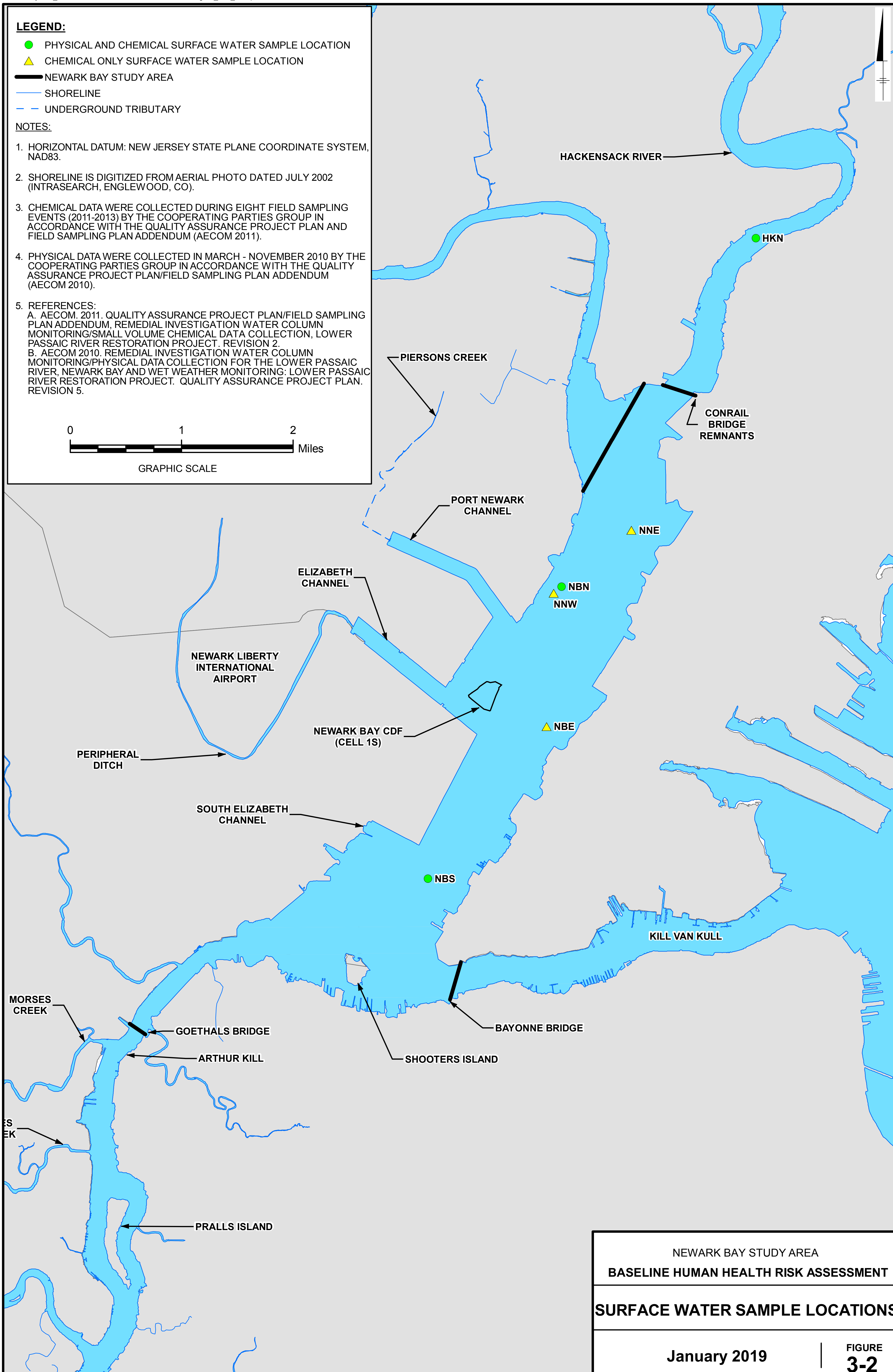

LEGEND:

- PHYSICAL AND CHEMICAL SURFACE WATER SAMPLE LOCATION
- CHEMICAL ONLY SURFACE WATER SAMPLE LOCATION
- NEWARK BAY STUDY AREA
- SHORELINE
- UNDERGROUND TRIBUTARY

NOTES:

1. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD83.
2. SHORELINE IS DIGITIZED FROM AERIAL PHOTO DATED JULY 2002 (INTRASEARCH, ENGLEWOOD, CO).
3. CHEMICAL DATA WERE COLLECTED DURING EIGHT FIELD SAMPLING EVENTS (2011-2013) BY THE COOPERATING PARTIES GROUP IN ACCORDANCE WITH THE QUALITY ASSURANCE PROJECT PLAN AND FIELD SAMPLING PLAN ADDENDUM (AECOM 2011).
4. PHYSICAL DATA WERE COLLECTED IN MARCH - NOVEMBER 2010 BY THE COOPERATING PARTIES GROUP IN ACCORDANCE WITH THE QUALITY ASSURANCE PROJECT PLAN/FIELD SAMPLING PLAN ADDENDUM (AECOM 2010).
5. REFERENCES:
   A. AECOM. 2011. QUALITY ASSURANCE PROJECT PLAN/FIELD SAMPLING PLAN ADDENDUM, REMEDIAL INVESTIGATION WATER COLUMN MONITORING/SMALL VOLUME CHEMICAL DATA COLLECTION, LOWER PASSAIC RIVER RESTORATION PROJECT. REVISION 2.
   B. AECOM 2010. REMEDIAL INVESTIGATION WATER COLUMN MONITORING/PHYSICAL DATA COLLECTION FOR THE LOWER PASSAIC RIVER, NEWARK BAY AND WET WEATHER MONITORING: LOWER PASSAIC RIVER RESTORATION PROJECT. QUALITY ASSURANCE PROJECT PLAN. REVISION 5.

NEWARK BAY STUDY AREA

BASELINE HUMAN HEALTH RISK ASSESSMENT

SURFACE WATER SAMPLE LOCATIONS

January 2019

FIGURE 3-2

City: Citrix Div/Group: IM/DV Created By: K. SINSABAUGH Last Saved By: kgpeters
Newark Bay (B0009989.0061.00004)
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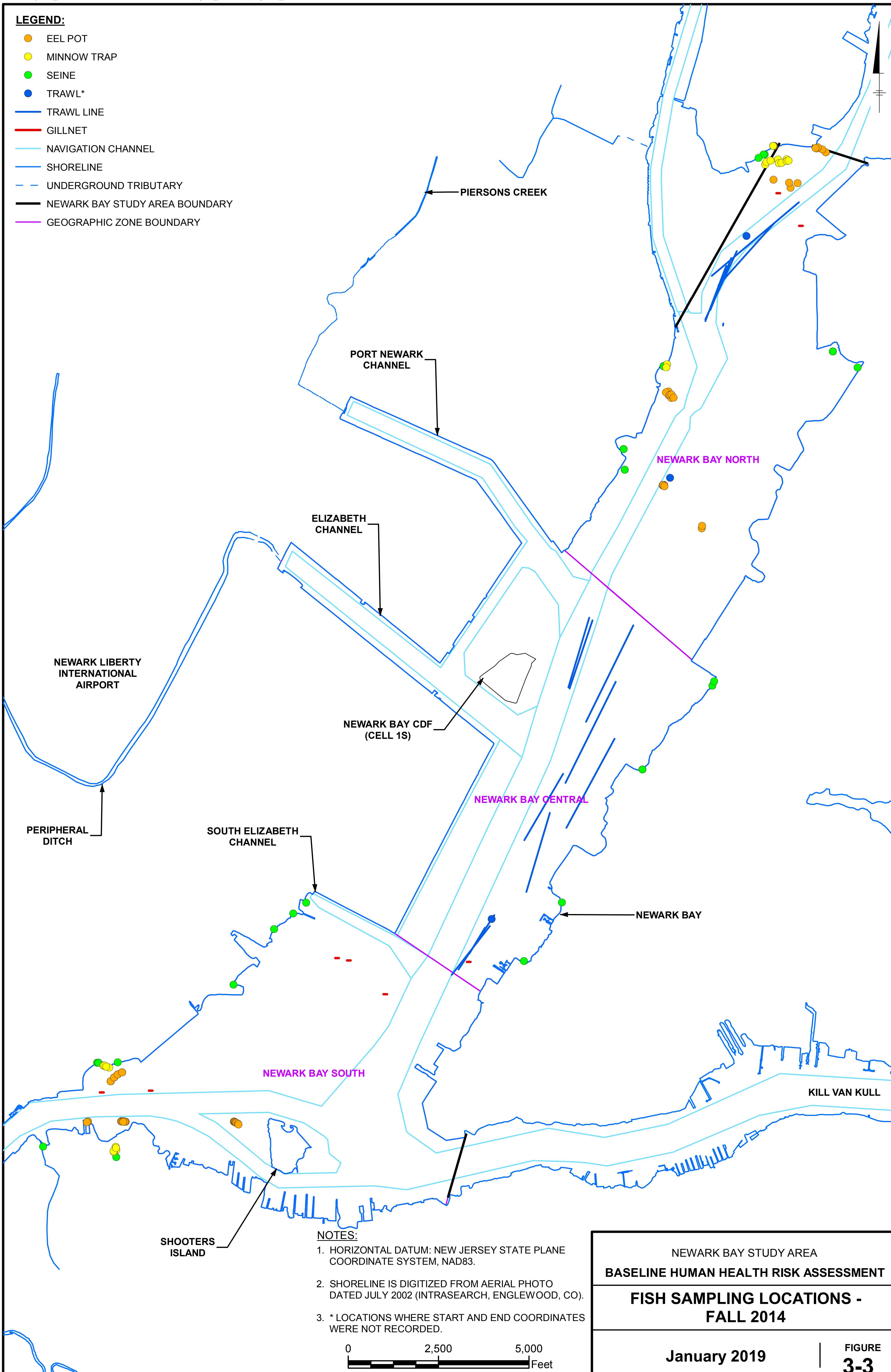


NOTES:

1. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD83.
2. SHORELINE IS DIGITIZED FROM AERIAL PHOTO DATED JULY 2002 (INTRASEARCH, ENGLEWOOD, CO).
3. * LOCATIONS WHERE START AND END COORDINATES WERE NOT RECORDED.

NEWARK BAY STUDY AREA

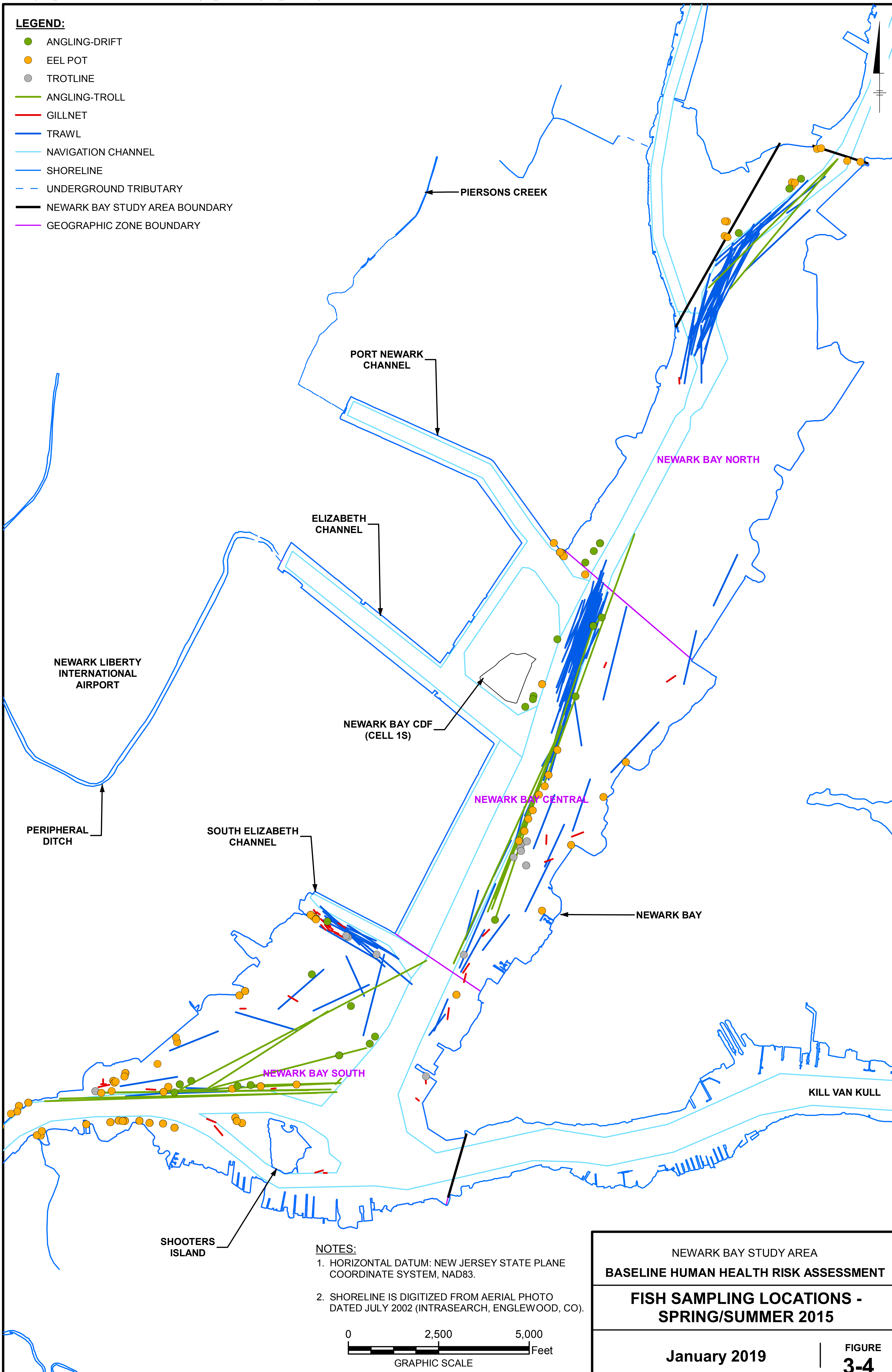
BASELINE HUMAN HEALTH RISK ASSESSMENT

FISH SAMPLING LOCATIONS - FALL 2014

January 2019

FIGURE **3-3**

DRAFT



NOTES:
1. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD83.
2. SHORELINE IS DIGITIZED FROM AERIAL PHOTO DATED JULY 2002 (INTRASEARCH, ENGLEWOOD, CO).

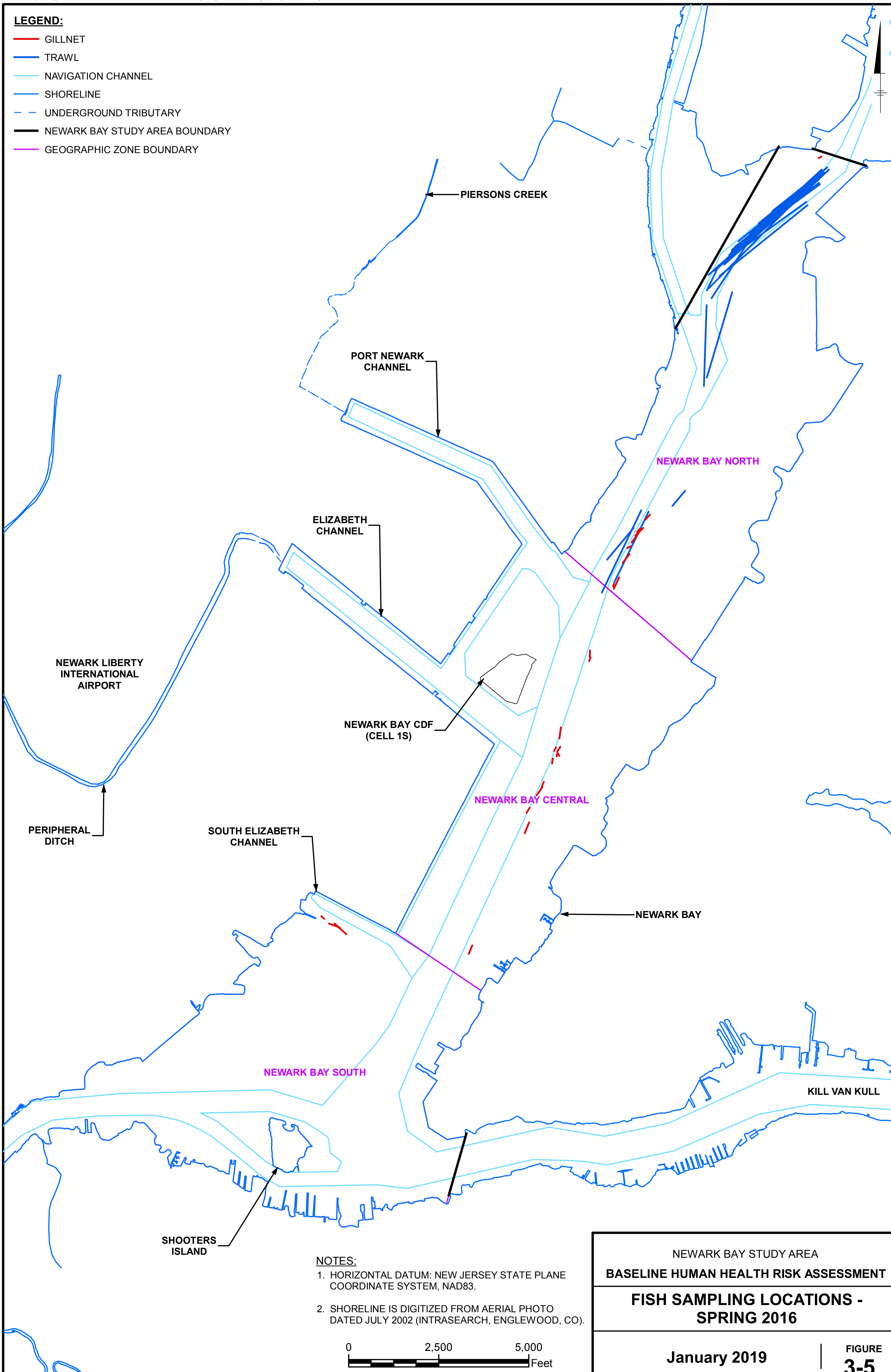
NEWARK BAY STUDY AREA
BASELINE HUMAN HEALTH RISK ASSESSMENT

FISH SAMPLING LOCATIONS - SPRING/SUMMER 2015

January 2019

FIGURE
3-4

DRAFT



NOTES:
1. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD83.
2. SHORELINE IS DIGITIZED FROM AERIAL PHOTO DATED JULY 2002 (INTRASEARCH, ENGLEWOOD, CO).

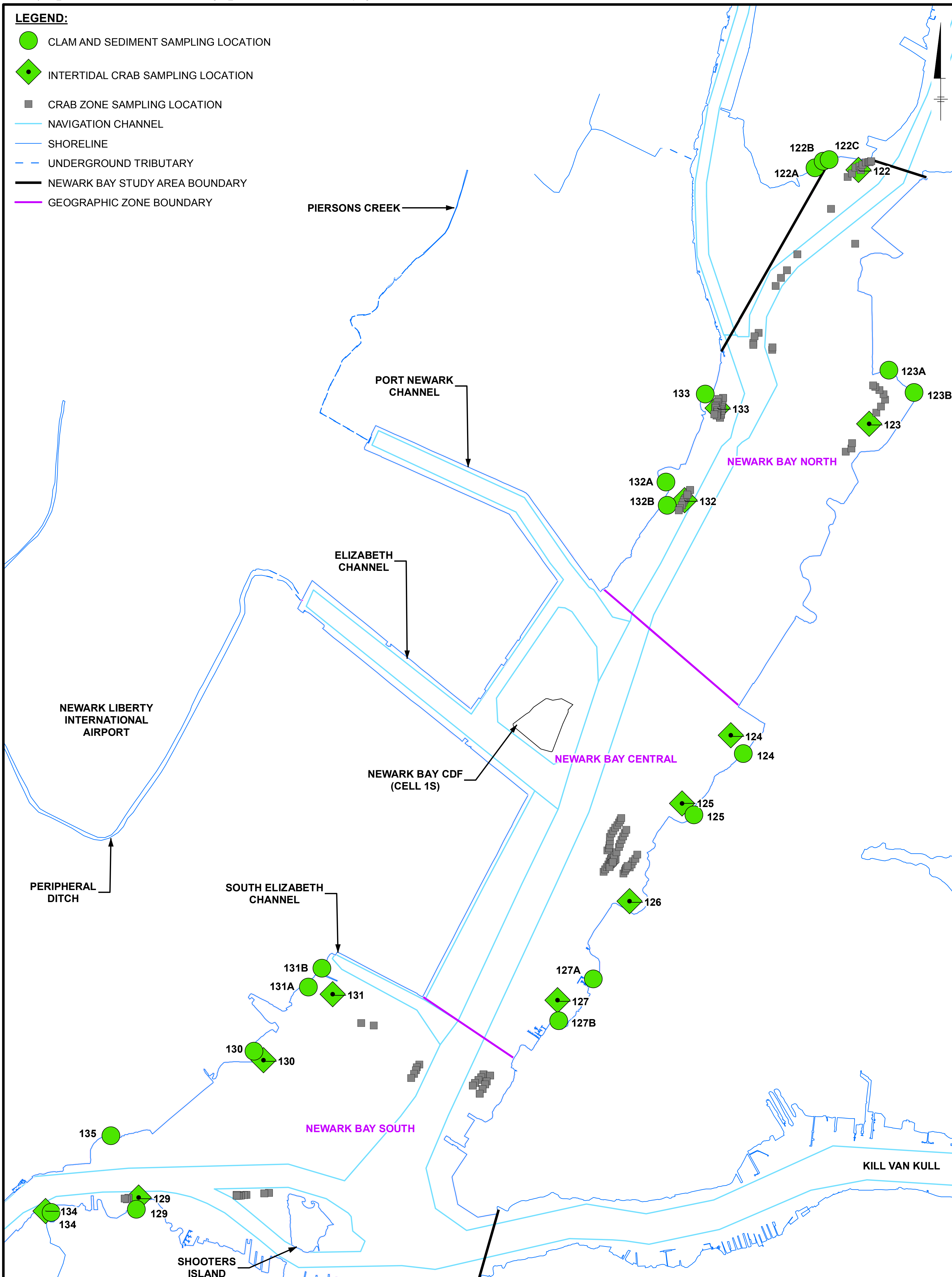
NEWARK BAY STUDY AREA
BASELINE HUMAN HEALTH RISK ASSESSMENT

FISH SAMPLING LOCATIONS - SPRING 2016

January 2019

FIGURE
3-5

City: Citrix Div/Group: IM/DV Created By: K. SINSABAUGH Last Saved By: kgpeters
Newark Bay (B0009989.0061.00001)
Z:\GISProjects_ENV\GSH\GIS\Task\NBSA\BHHRA\MXD\Fig3-6_Overall Crab Clam Sediment Sampling Locations.mxd 12/28/2018 4:34:34 AM



NOTES:

1. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATE SYSTEM, NAD83.
2. SHORELINE IS DIGITIZED FROM AERIAL PHOTO DATED JULY 2002 (INTRASEARCH, ENGLEWOOD, CO).
3. THE GRAY SQUARES REPRESENT LOCATIONS WHERE CRAB TRAPS WERE PLACED FOR THE COLLECTION OF CRABS FOR THE ZONE SAMPLES (NEWARK BAY NORTH, CENTRAL, AND SOUTH). THE GREEN DIAMONDS REPRESENT INTERTIDAL CRAB SAMPLE LOCATIONS THAT WERE GEOREFERENCED. THE COMPOSITE CRAB ZONE SAMPLES WERE NOT GEOREFERENCED AND ARE NOT SHOWN ON THIS FIGURE.

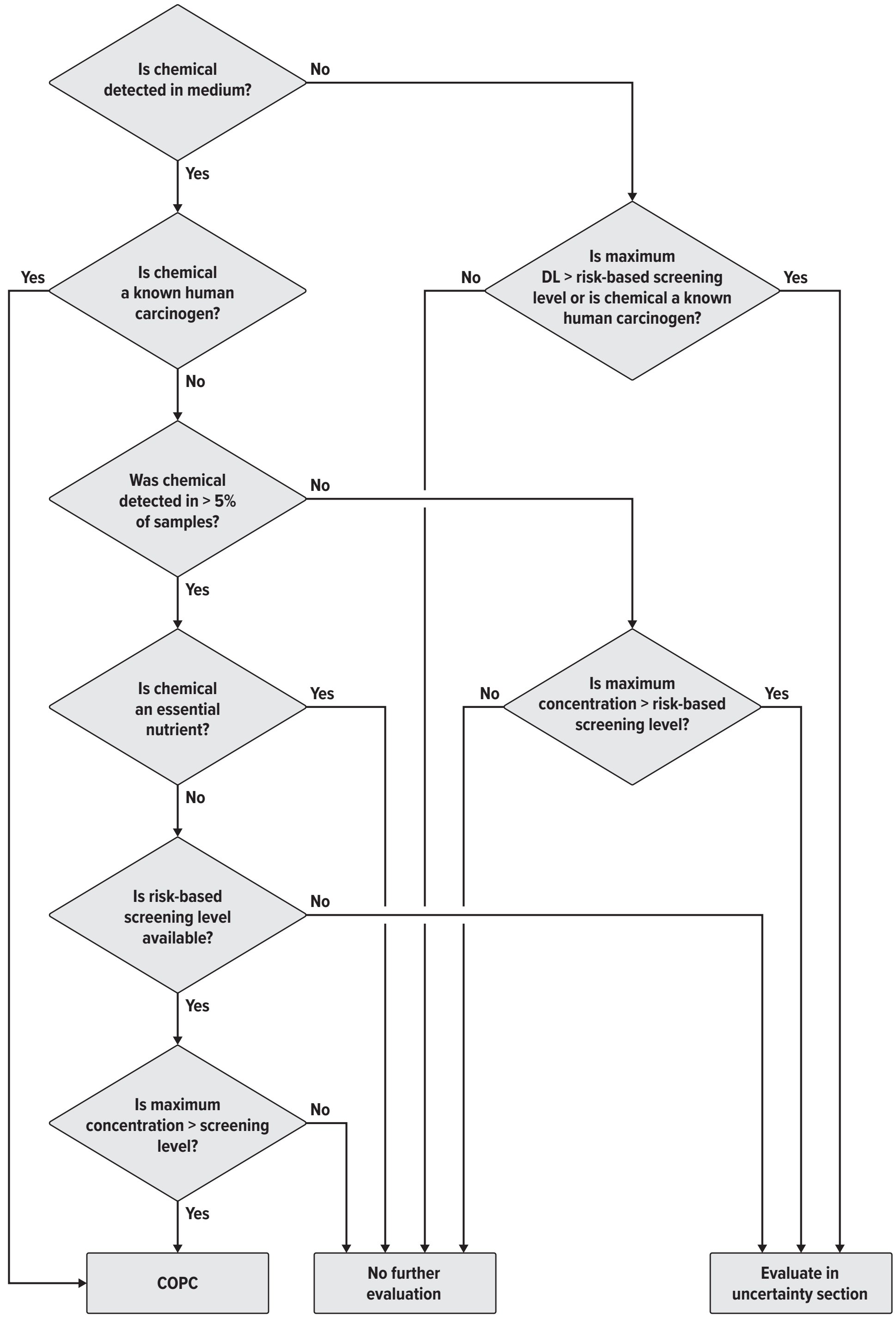
0 2,500 5,000 Feet
GRAPHIC SCALE

NEWARK BAY STUDY AREA
BASELINE HUMAN HEALTH RISK ASSESSMENT

CRAB, CLAM, AND SEDIMENT SAMPLING LOCATIONS

January 2019

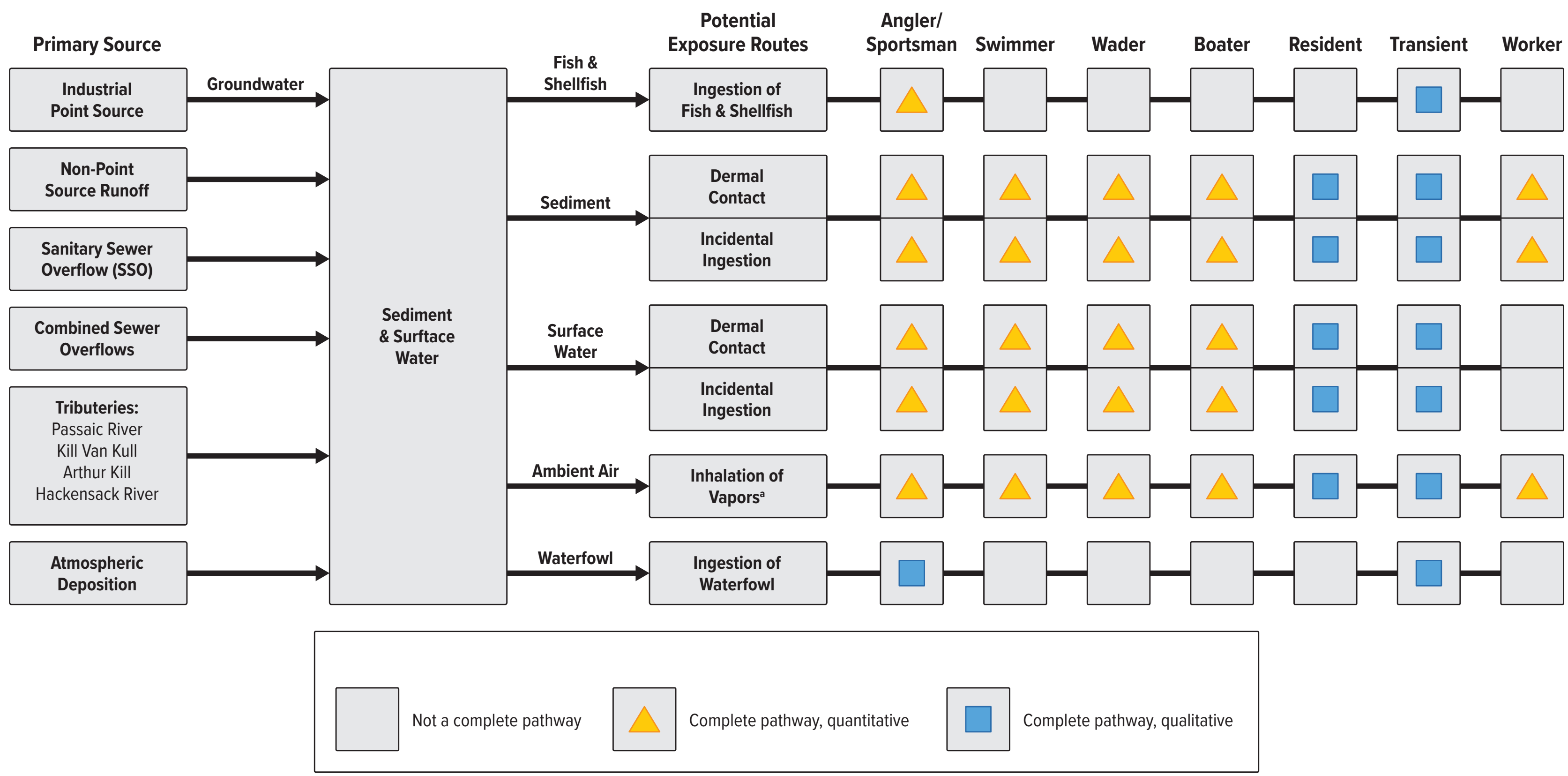
FIGURE
3-6



Newark Bay Study Area Baseline Human Health Risk Assessment

COPC Selection Process

Figure 3-7

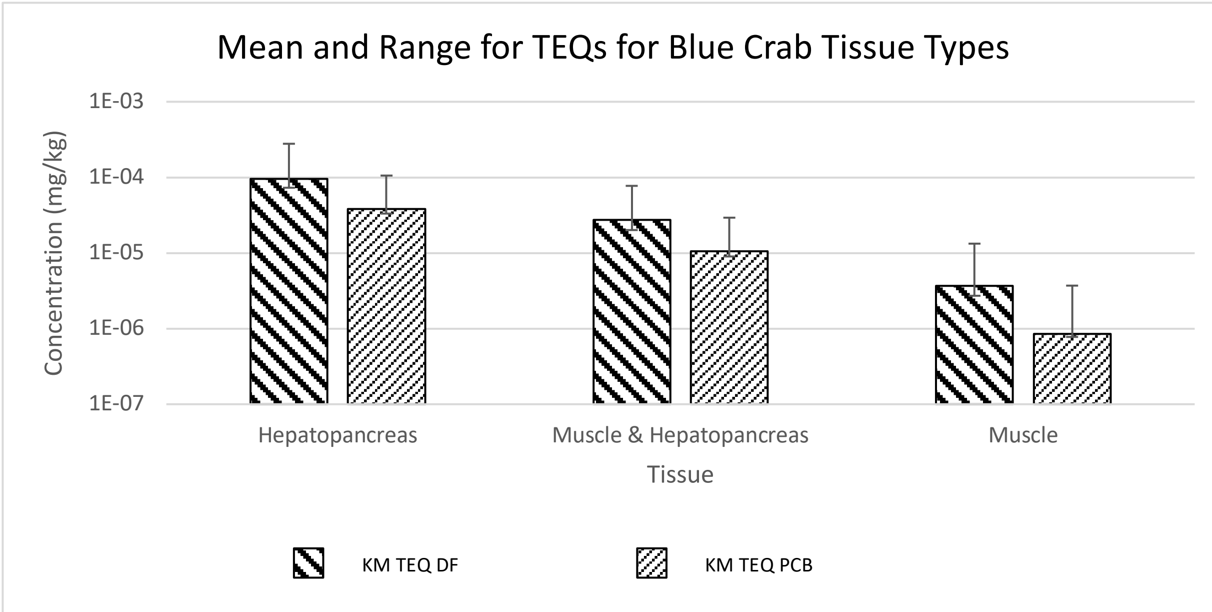


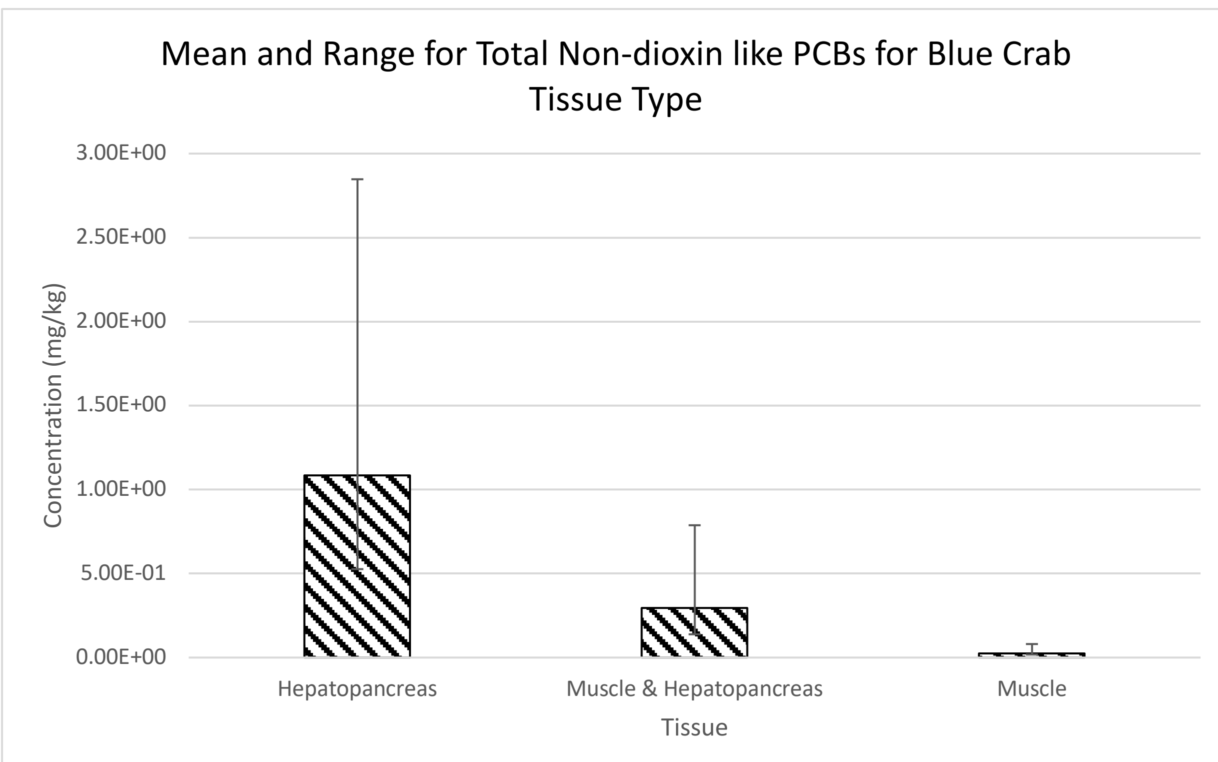
(a) Inhalation of vapors in outdoor air from surface water or exposed sediment poses negligible risks for all potential receptors (see Appendix D); therfore this pathway is not considered further in the BHHRA.

Newark Bay Study Area Baseline Human Health Risk Assessment

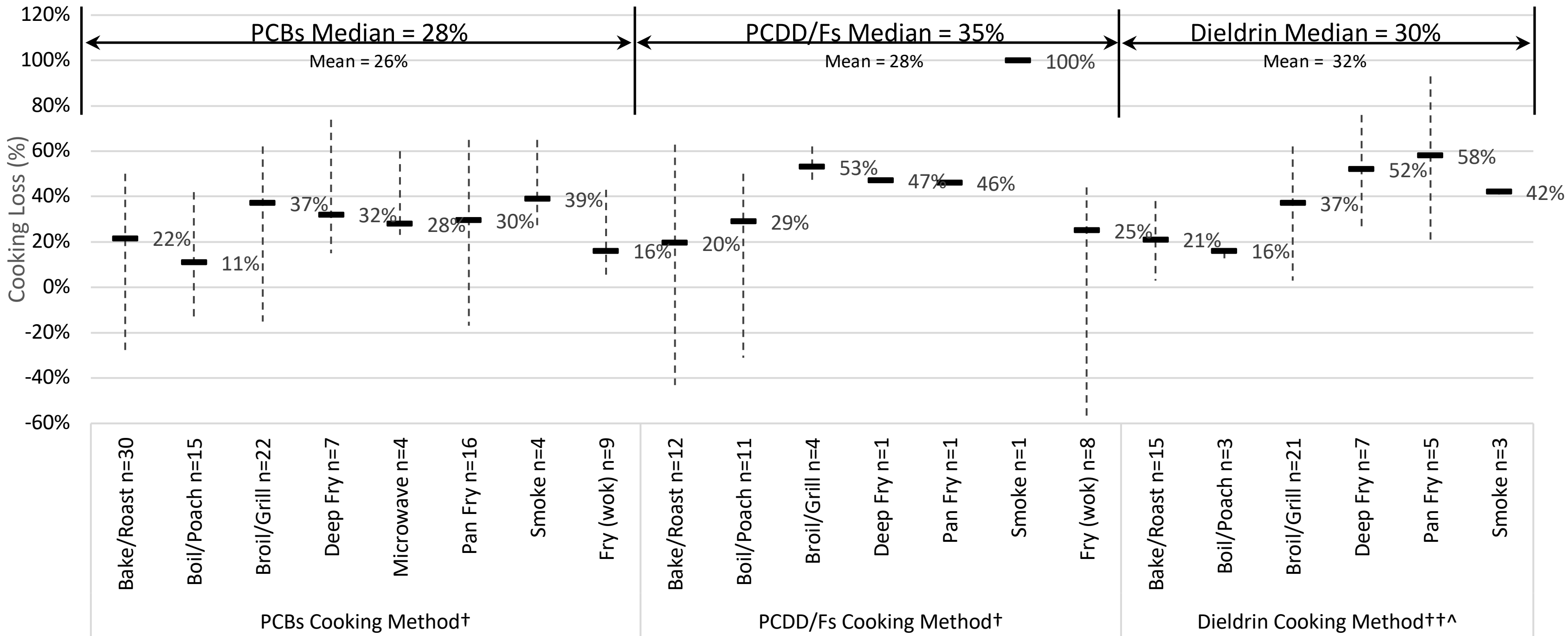
General Human Health Conceptual Site Model for the NBSA

Figure 4-1





Newark Bay Study Area Baseline Human Health Risk Assessment	**Mean and Range of TEQs and Non-DL PCBs for Blue Crab Tissue Types** **Figure 7-1**

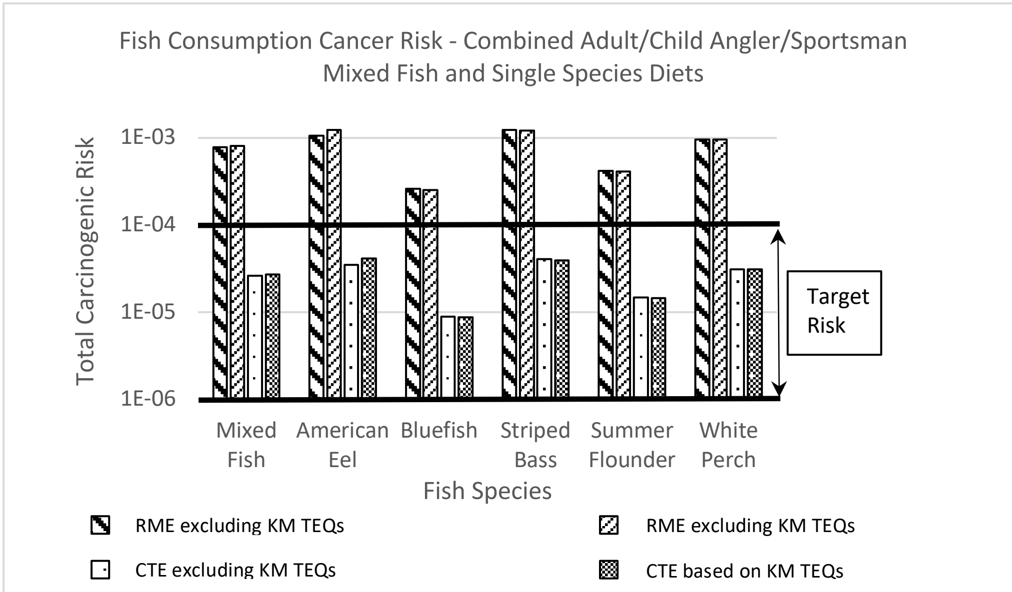


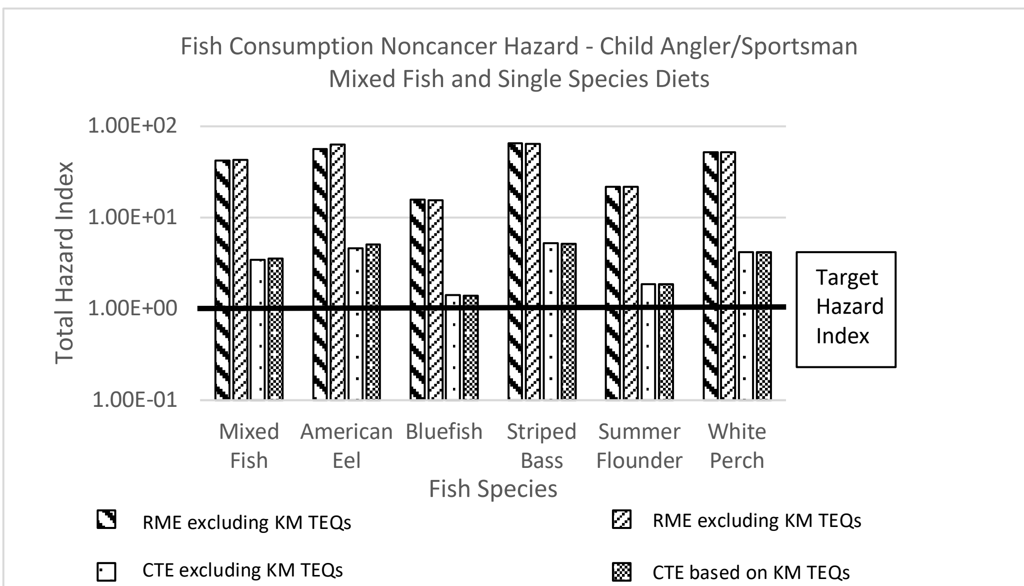
† two PCB and three PCDD/Fs values removed per outlier analysis (Leys et al., 2013)
†† non-cooking values excluded (e.g., trimming, dressing, canning)
^ two sets of cooking loss values excluded because they were duplicates (same fish, same location, same cooking method)

Newark Bay Study Area
Baseline Human Health Risk Assessment

Median and Range of Mass Loss by COPC and Cooking Method

Figure 7-2

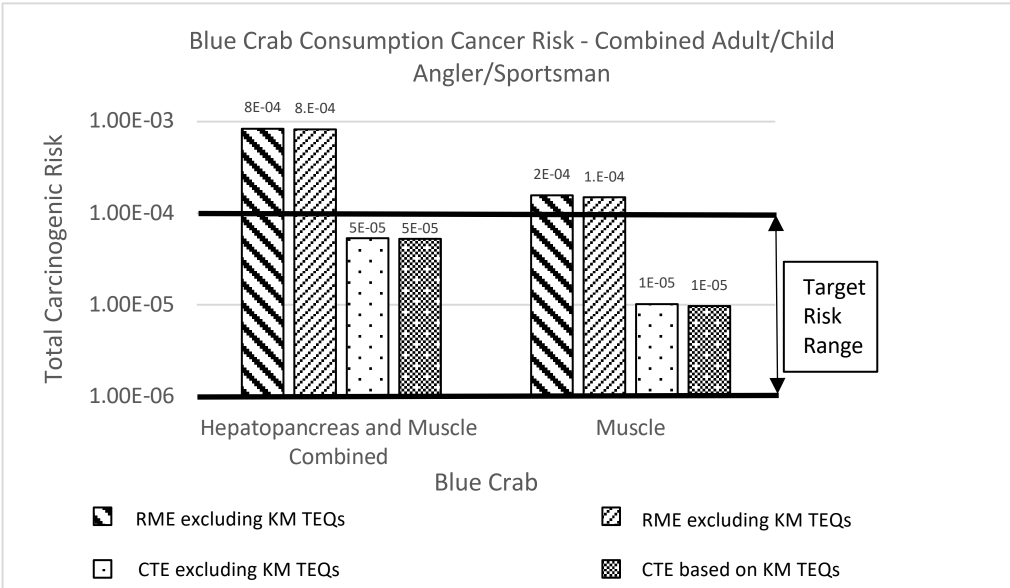


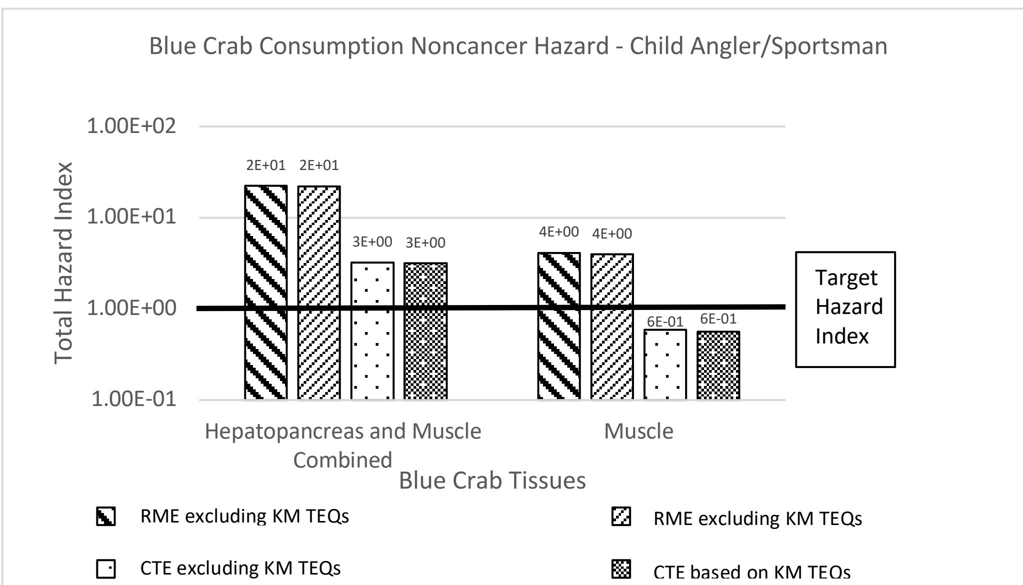


Newark Bay Study Area Baseline Human Health Risk Assessment

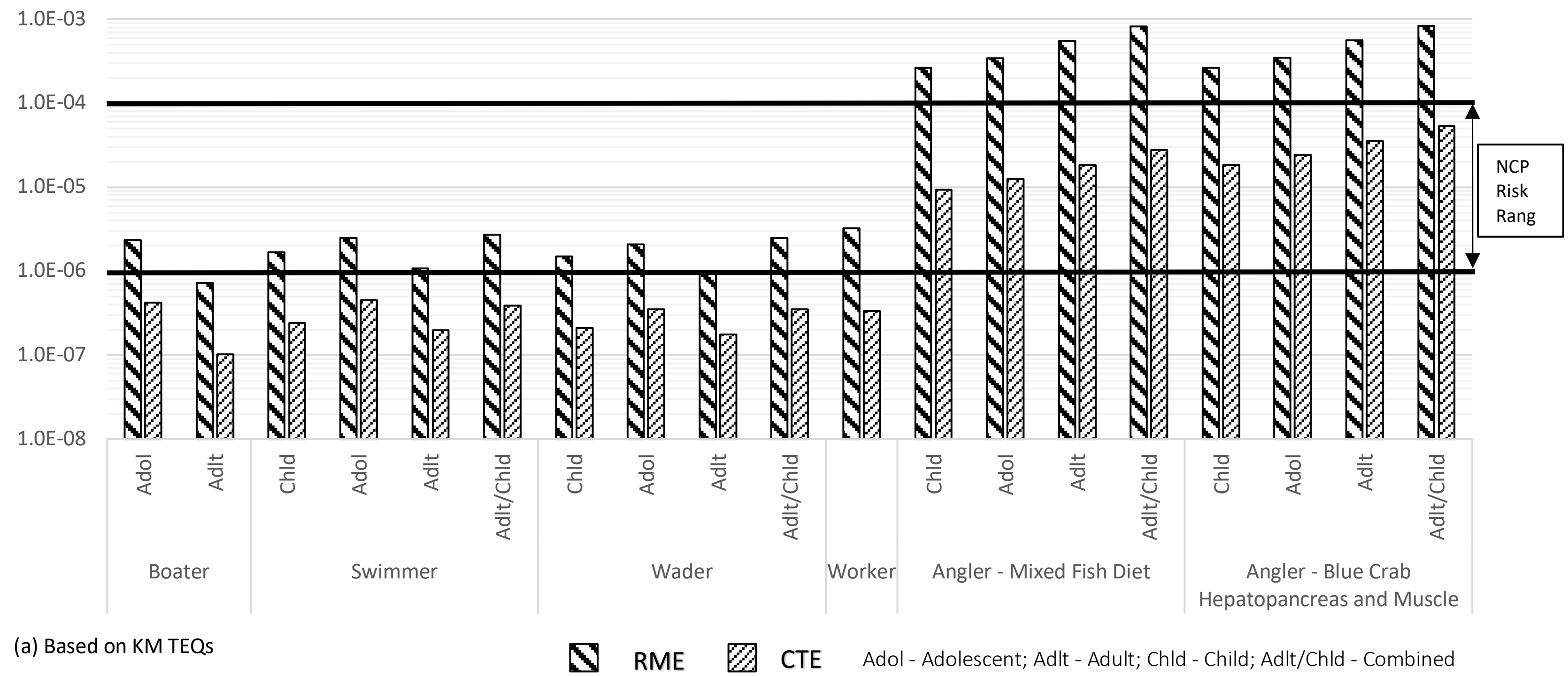
Single Fish Species Diet Risk/Hazard

Figure 7-3

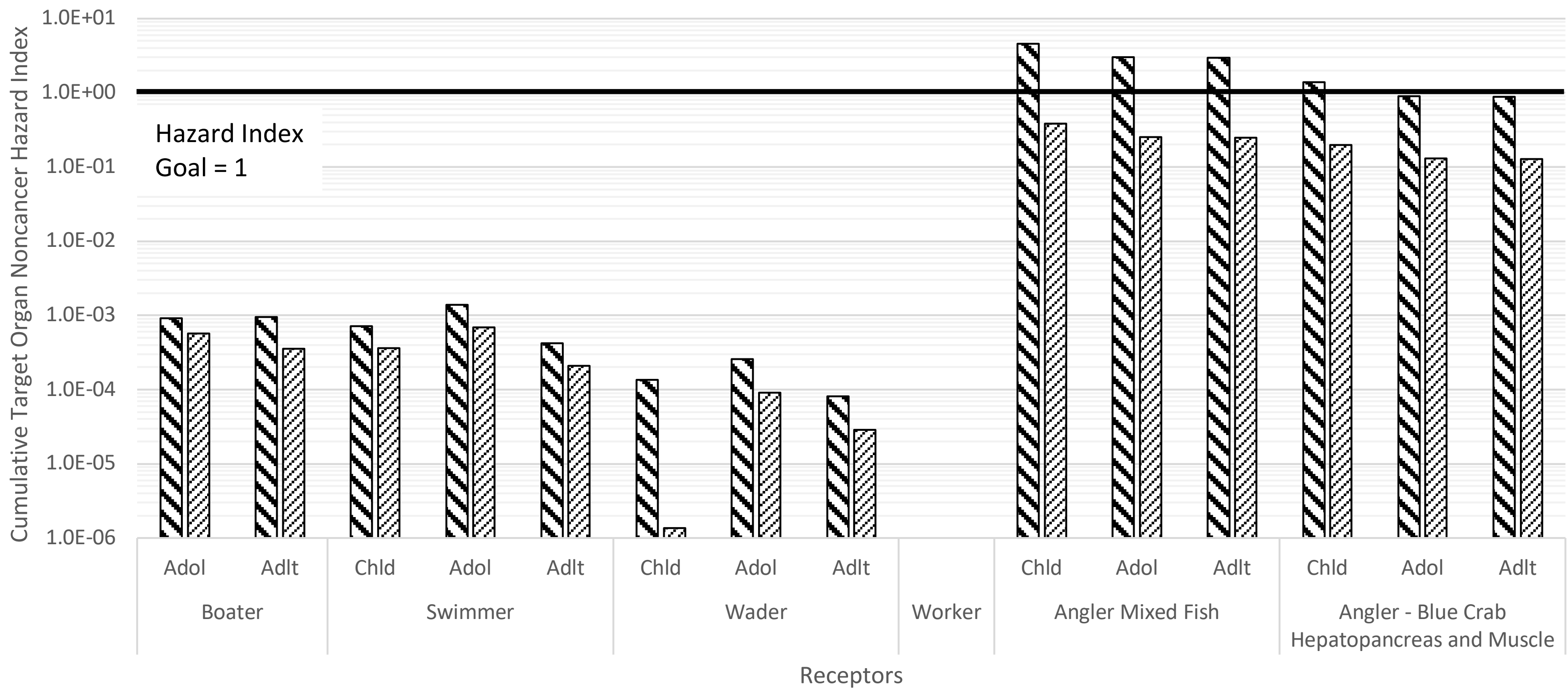




Newark Bay Study Area Baseline Human Health Risk Assessment	**Alternative Crab Diet Risk/Hazard** **Figure 7-4**



Newark Bay Study Area Baseline Human Health Risk Assessment	Summary of Cumulative Cancer Risk – All Receptors
	Figure 8-1



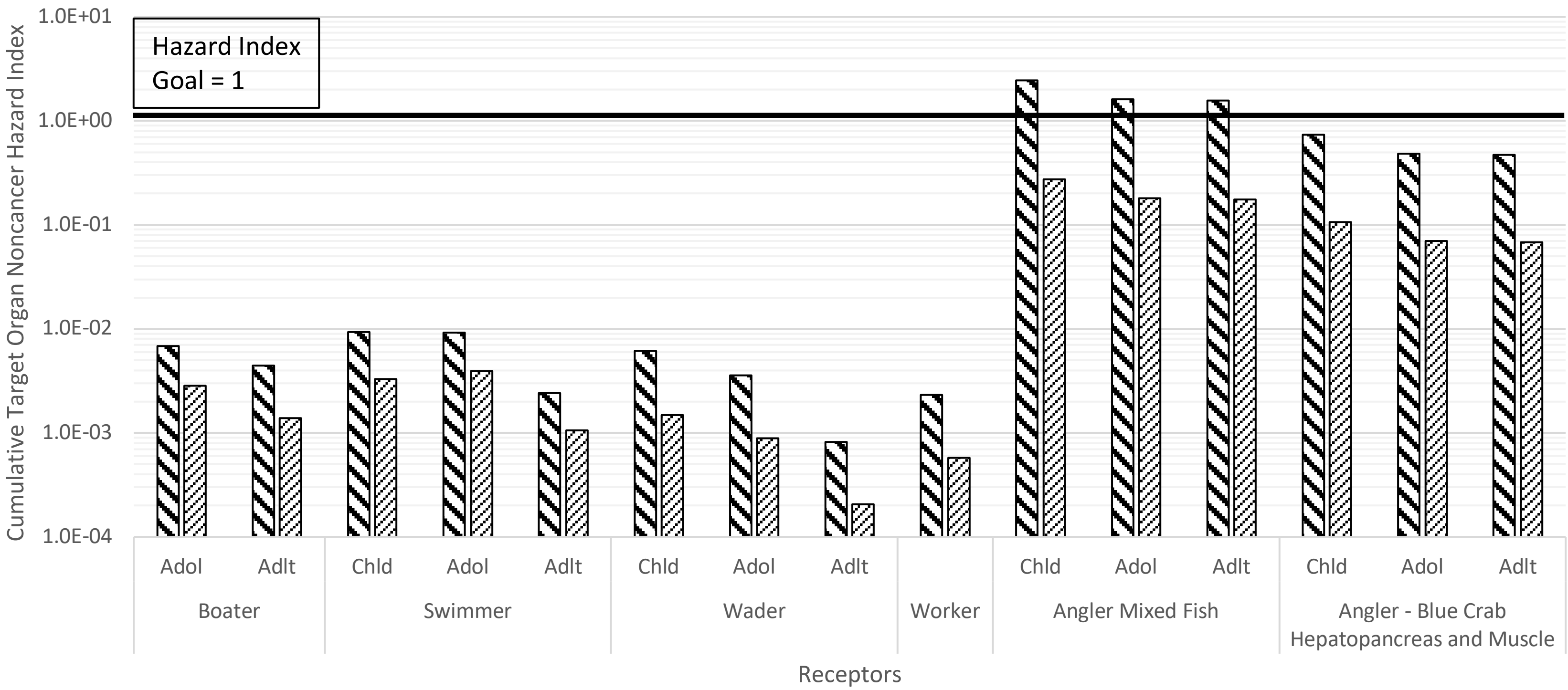
(a) Based on KM TEQs

Adol - Adolescent; Adlt - Adult; Chld - Child

Newark Bay Study Area Baseline Human Health Risk Assessment

Summary of Cumulative Target Organ Effect Noncancer Hazard Indices (Liver) – All Receptors

Figure 8-2



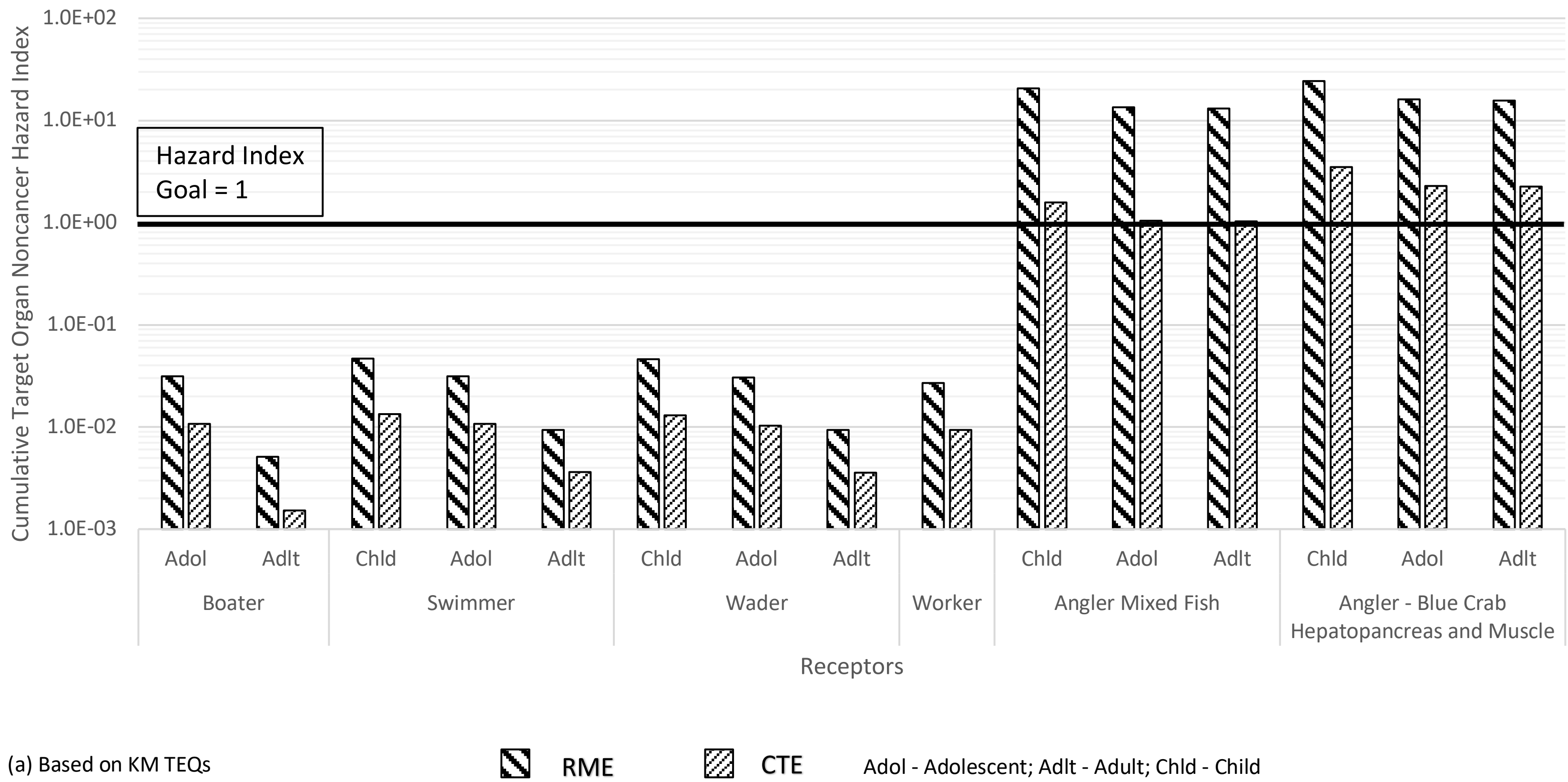
(a) Based on KM TEQs

Adol - Adolescent; Adlt - Adult; Chld - Child

Newark Bay Study Area Baseline Human Health Risk Assessment

Summary of Cumulative Target Organ Effect Noncancer Hazard Indices (Neurological) – All Receptors

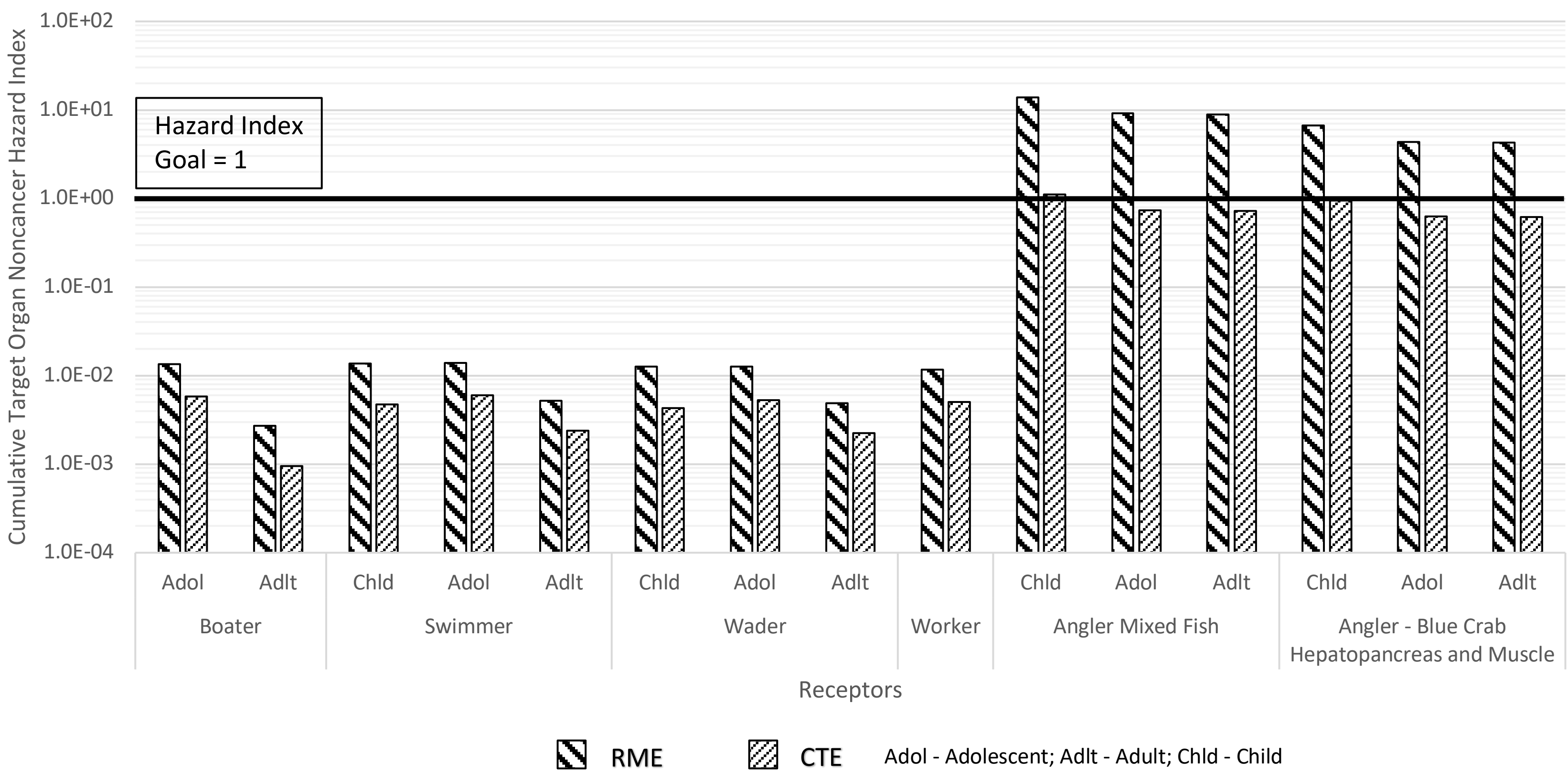
Figure 8-3



Newark Bay Study Area Baseline Human Health Risk Assessment

Summary of Cumulative Target Organ Effect Noncancer Hazard Indices (Reproductive) – All Receptors

Figure 8-4



(a) Based on KM TEQs

Newark Bay Study Area Baseline Human Health Risk Assessment

Summary of Cumulative Target Organ Effect Noncancer Hazard Indices (Whole Body) – All Receptors

Figure 8-5